



Legacy Nature Preserve

ADAPTIVE MANAGEMENT PLAN

NOVEMBER 2005

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	S-1
CHAPTER ONE. INTRODUCTION/REGULATORY REQUIREMENTS/PERMIT CONDITIONS AND PHASES/WETLAND AND WILDLIFE IMPACTS/MANAGEMENT PLAN DEVELOPMENT	1-1
Introduction	1-1
In the Beginning	1-2
The Legacy Nature Preserve (LNP)	1-5
Regulatory Requirements	1-5
Permit Conditions	1-7
Permit Phases	1-8
Wetland and Wildlife Impacts	1-9
Wetlands	1-9
Wildlife	1-9
Adaptive Management Plan Development	1-11
Collaborative Design Team (CDT)	1-12
Mission Statement	1-13
Guiding Principles	1-13
Collaborative Design Process	1-13
CHAPTER TWO. DEFINITION OF ADAPTIVE MANAGEMENT/PROCESS OF ADAPTIVE MANAGEMENT/IN CONCLUSION	2-1
Definition of Adaptive Management	2-1
Process of Adaptive Management	2-2
Define the Mission of the LNP	2-2
Develop a Conceptual Model of the LNP	2-2
Develop a Management Plan to Maximize Results and Learning	2-2
Develop a Monitoring Plan to Test Assumptions	2-3
Implement Management and Monitoring Plans	2-3
Analyze Data and Communicate Results	2-3
Use Results to Adapt and Learn	2-3
In Conclusion	2-4
CHAPTER THREE. LNP OVERVIEW/MANAGEMENT AREA ISSUES AND OBJECTIVES/EDUCATION AND PUBLIC ACCESS.....	3-1
LNP Overview	3-1
Legacy Nature Preserve Management Areas	3-3
Riverine Management Area – 187.00 Acres	3-3
RMA Issues	3-5
RMA Objectives	3-5
Evaporative Basins Management Area – 221.42 Acres	3-7
EBMA Issues	3-8
EBMA Objectives	3-9
Alkali Flats and Slope Wetlands Management Area – 852.25 Acres	3-11
AFMA Issues	3-12

AFMA Objectives	3-12
Wet Meadow Management Area – 273.68 Acres.....	3-15
WMMA Issues	3-15
WMMA Objectives	3-15
Farmington Bay Management Area – 569.40 Acres	3-17
FBMA Issues	3-18
FBMA Objectives.....	3-18
Education and Public Access	3-20
Community Priorities.....	3-22
Education and Public Access Issues and Objectives.....	3-22
Public Access Objectives.....	3-22
Education Objectives.....	3-23
 CHAPTER FOUR. ADAPTIVE MANAGEMENT PLAN IMPLEMENTATION FOR PHASES I-III/ LONG-TERM FINANCIAL PACKAGE/ADMINISTRATION AND STAFFING	 4-1
Adaptive Management Plan Implementation.....	4-1
Phase I.....	4-1
Phase II.....	4-4
Adaptive Management Plan Development.....	4-5
Comprehensive Water Management Plan.....	4-5
Public Use and Education Management Plan	4-5
Vegetation Management Plan	4-6
Phase III.....	4-7
Long-term Financial Package	4-7
Administration and Staffing	4-8
Phase I.....	4-8
Phase II.....	4-9
Phase III.....	4-10
 CHAPTER FIVE. REFERENCES.....	 5-1
 APPENDIX A. ABBREVIATIONS AND ACRONYMS.....	 A-1
 APPENDIX B. GLOSSARY	 B-1

LIST OF TABLES

Table 1.1. Direct and Indirect Wetland Impacts by Acres	1-9
Table 1.2. Wetland Cover Types Impacted by Parkway	1-10
Table 1.3. Mitigation by Area Impacted	1-10
Table 1.4. Direct Wildlife Habitat Losses (Legacy Parkway Right-of-way)	1-11
Table 3.1. Vision Prioritization (Board Results)	3-22
Table 4.1. Summary of LNP Phase I Implementation Measures.....	4-2

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LEGACY NATURE PRESERVE ADAPTIVE MANAGEMENT PLAN

EXECUTIVE SUMMARY



The Legacy Nature Preserve (LNP) permanently protects approximately 2,100 acres of wildlife habitat within the Great Salt Lake ecosystem and serves as mitigation for the 14-mile Legacy Parkway located primarily in Davis County, Utah. As an integral part of the Great Salt Lake ecosystem, the LNP contains a variety of wetland complexes and uplands that provide critical habitat for migrating shorebirds and waterfowl. However, many of these natural areas, utilized by millions of birds each year, have been altered through human activity. As part of mitigation for the Legacy Parkway, the areas within the LNP will be restored, enhanced, and preserved in perpetuity.

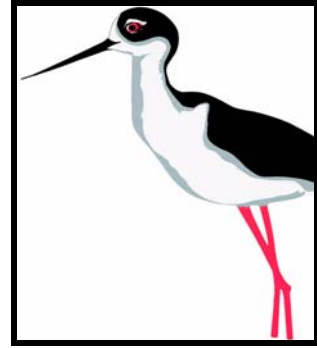
This Legacy Nature Preserve Adaptive Management Plan (AMP) provides guidance to LNP managers as they meet the mitigation requirements established by the U.S. Army Corps of Engineers (Corps) Section 404 permit and manage the nearly 2,100 acre parcel over the long term. Based on the principles of adaptive management, this AMP is intended to be a dynamic document that may evolve over time, based on information acquired during management and monitoring efforts.

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CHAPTER ONE

1

INTRODUCTION REGULATORY REQUIREMENTS PERMIT CONDITIONS AND PHASES WETLAND AND WILDLIFE IMPACTS MANAGEMENT PLAN DEVELOPMENT



INTRODUCTION

Over the last several decades, the Wasatch Front has experienced a tremendous population boom. As the population in northern Utah continues to escalate, growth pressures in and around the existing urban areas cannot be ignored. Along the northern Wasatch Front, urban development pressures are extending east to the foothills of the Wasatch Mountains and west to the shores of the Great Salt Lake, particularly in Davis County, an area historically known for agriculture and open lands.

Increased traffic pressures in northern Salt Lake County and southwestern Davis County are a direct result of the population growth concentrated north of Salt Lake City. The Utah Department of Transportation (UDOT) has identified the construction of a roadway west of Interstate 15 and east of the Great Salt Lake as a means to improve traffic congestion in this corridor. The proposed Legacy Parkway will begin at the intersection of 2100 North and Interstate 215 in Salt Lake City, Utah, and end at the U.S. Highway 89 and Interstate 15 interchange in Farmington, Utah.

However, the Legacy Parkway alone cannot solve the traffic congestion in the area. UDOT has acknowledged that a "Shared Solution" is needed for the area, and that the Legacy Parkway is only one piece of the puzzle. Other pieces include adding more transit options (including a commuter rail); I-15 reconstruction; the improvement of local roads like Redwood Road, 500 South, and U.S. 89; and transportation demand management. When the Legacy Parkway is combined with these other options, they create a Shared Solution to the transportation issues in southern Davis County.

As a result of growth and land use practices in the area, wetland habitat on the eastern shore of the Great Salt Lake has been disturbed, and the natural flow of water from the Wasatch Mountains has been interrupted. In order to accommodate growth and yet preserve essential wetland habitat in Davis County, UDOT is fulfilling a mandate to develop the Legacy Nature Preserve (LNP) in conjunction with the Parkway, to protect quality and enhance wildlife habitats in perpetuity.

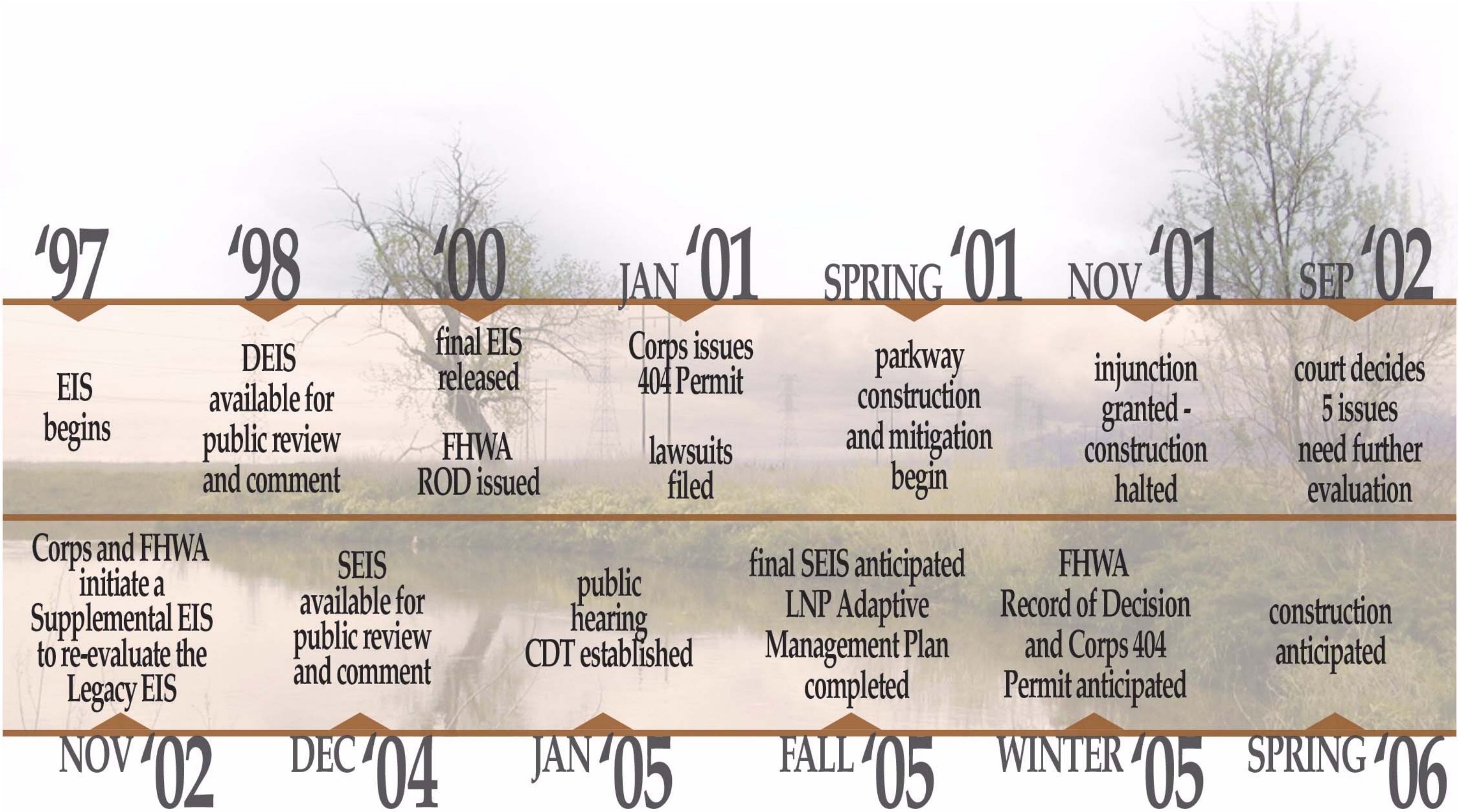
IN THE BEGINNING

Under the National Environmental Policy Act of 1969 (NEPA), an Environmental Impact Statement (EIS) was required in order to assess the potential environmental impacts of the proposed Parkway construction. The EIS process began in 1997, and in June of 2000, a final EIS detailing the environmental impacts of the Legacy Parkway was completed. One of the findings of the EIS was that 114 acres of wetlands along the shores of the Great Salt Lake, more than 14 miles, would be disturbed if the Legacy Parkway Project was implemented.

On January 9, 2001, the U.S. Army Corps of Engineers (Corps) issued a Section 404 permit (Permit No. 199650197) allowing the dredge and fill of identified wetlands for construction of the Legacy Parkway. As a condition of Parkway construction, UDOT was required by the Corps to mitigate the direct and indirect impacts to jurisdictional wetlands caused by the project. In order to protect, preserve, and enhance wetlands and wildlife habitat along the Great Salt Lake, the concept of a nature preserve was developed. Ultimately, the 2,098-acre LNP has been determined to be effective mitigation for the 114 acres of jurisdictional wetland disturbance resulting from the Parkway construction. Included in the 2,098 acres are 778 acres of jurisdictional wetlands.

The LNP was developed over a three-year period as part of the mitigation effort outlined in the Corps Section 404 permit. Originally, the LNP identified in the EIS was 1,251 acres. However, 317 acres were added to the LNP adjacent to the Farmington Bay Waterfowl Management Area to mitigate for impacts to wildlife that the U.S. Fish and Wildlife Service (USFWS) believed were not adequately addressed in the EIS. After the Environmental Protection Agency (EPA) raised concerns regarding the sufficiency of the proposed mitigation, another 530 acres were added to the LNP, bringing the total to its current acreage.

In early 2001, shortly after the Corps issued the Section 404 permit, several lawsuits were filed in opposition to the Parkway. Despite the legal conflicts, construction of the Parkway began in May 2001 but was halted in November 2001 after an injunction was granted. A Supplemental EIS (SEIS) was required after the 10th U.S. Circuit Court of Appeals ruled that five issues were in need of further evaluation. The issues requiring additional analysis were the Denver & Rio Grande (D&RG) Alternative; sequencing of Legacy, Transit and I-15 North; integration of transit; right-of-way widths; and impacts to wildlife. The mitigation, monitoring, reporting and long-term planning of the LNP began in 2001 and has continued despite the legal injunction that has halted construction of the Parkway.



Timeline of Legacy Nature Preserve and Parkway activities.

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THE LEGACY NATURE PRESERVE

The LNP is a small but integral part of the Great Salt Lake ecosystem, which provides foraging, nesting, and staging habitat for millions of migratory birds from around the world. It is home to hundreds of species of plants and animals. Species dependent on the Great Salt Lake's unique habitat will greatly benefit from the establishment and protection of the LNP.

In order to promote a healthy wetland ecosystem, it is important to have large areas of contiguous, undeveloped wildlife habitat. The LNP serves as an important component connecting existing preservation areas. For example, the Farmington Bay Wildlife Management Area (FBWMA) and local duck clubs border the LNP, and together they create contiguous wildlife habitat along the Great Salt Lake shoreline. The wetland conservation and management areas along the eastern and south-eastern shores of the Great Salt Lake, totalling over 135, 000 acres, play an important role in providing habitat for wildlife:

- Salt Creek Waterfowl Management Area (8,800 acres)
- Public Shooting Grounds Waterfowl Management Area (9,900 acres)
- Bear River Migratory Bird Refuge (74,000 acres)
- Harold Crane Waterfowl Management Area (11,300 acres)
- Willard Bay Upland Game Wildlife Management Area (2,000 acres)
- Ogden Bay Waterfowl Management Area (18, 200 acres)

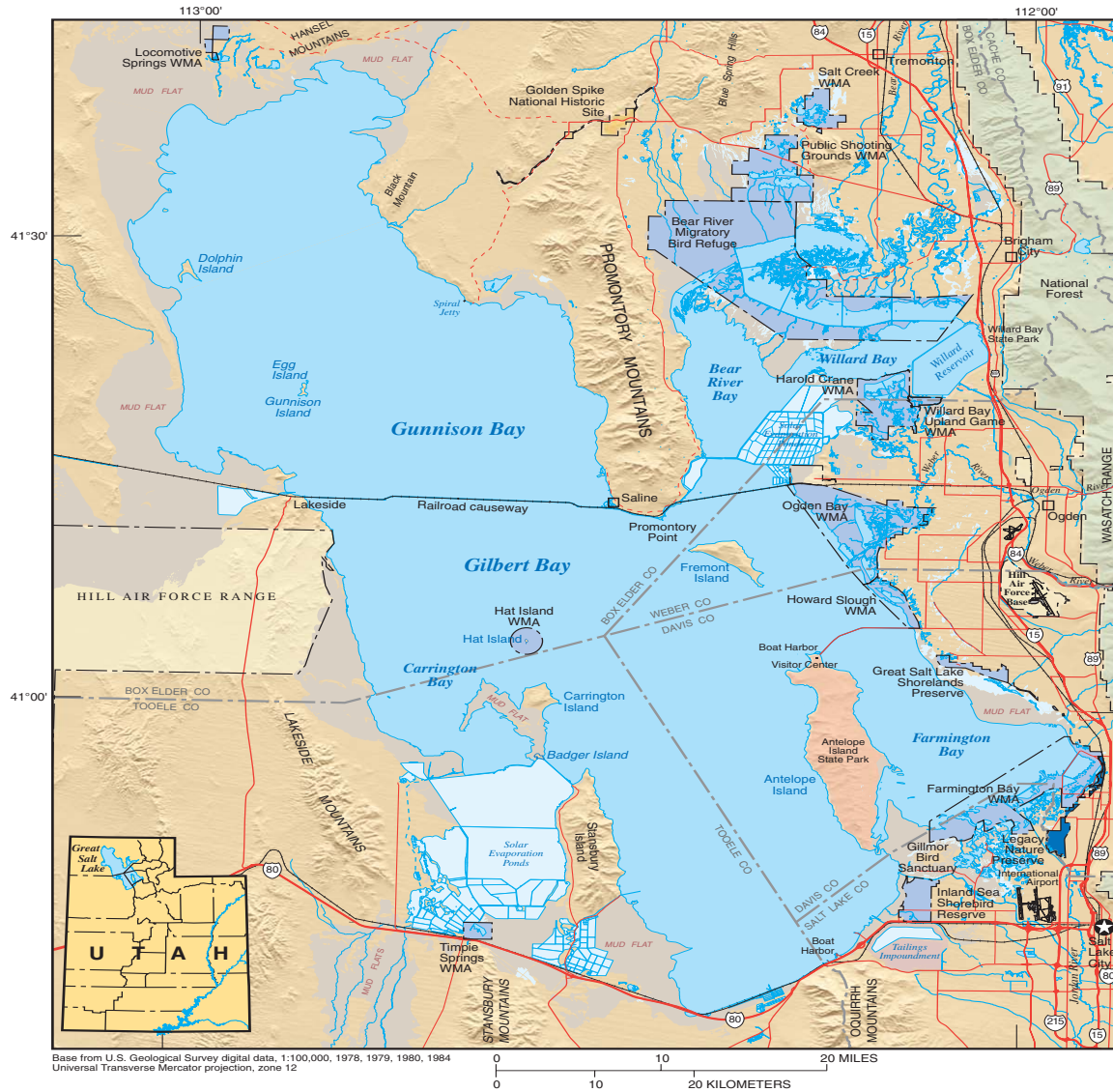
- Howard Slough Waterfowl Management Area (3,800 acres)
- Layton Wetlands Preserve (2,000 acres)
- Gillmor Bird Sanctuary (1,400 acres)
- Inland Sea Shorebird Reserve (3,670 acres)

The nearly 2,100-acre LNP contains a variety of wetland complexes, riparian habitats, and uplands. Nearly 900 acres of the LNP are some type of wetland or riparian habitat, such as wet meadow, sedge-cattail, mudflat/pickleweed, or open water. Desert salt scrub habitat, cropland, and pastures, all considered uplands, comprise over 1,200 acres of the LNP.

REGULATORY REQUIREMENTS

Congress passed the amended Clean Water Act in 1977 to protect the physical, biological, and chemical quality of waters of the United States. Section 404 of the Clean Water Act is the part of the law that requires a permit for placing any dredge or fill material in the any waters of the U.S., including our nation's rivers, streams, ponds, lakes, or wetlands. The Section 404 permit is administered by the Corps and the EPA.

A Section 404 permit was issued to UDOT in January 2001 to place fill material into 114 acres of wetlands along a 14-mile length of the Parkway. The permit assumed that all 114 acres of wetlands within the 328-foot right-of-way would be filled. However, UDOT has since modified the design of the Parkway to reduce impacts. The right-of-way is now only 312 feet, and the total number of acres that will be directly



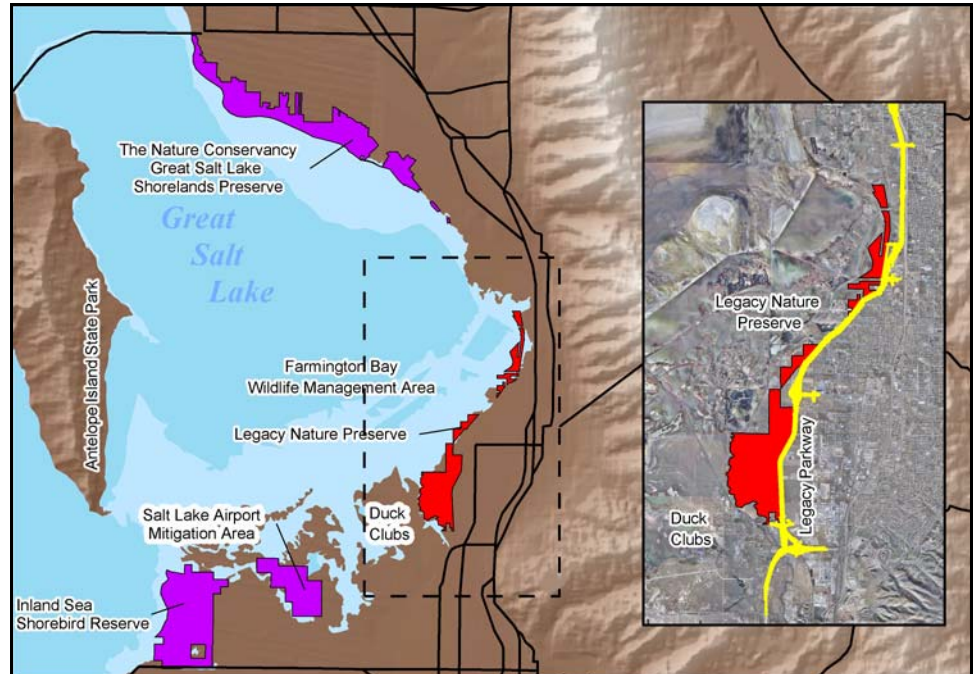
The Legacy Nature Preserve neighborhood, overview.

impacted is 113. It was also determined that 10 additional acres of wetlands could be avoided through design adjustments located primarily in the interchange areas within the right-of-way; therefore the total number of acres directly disturbed by the highway footprint has been reduced to 103. A new Section 404 permit is currently being issued to address the fill of these 103 acres. It is anticipated that the new permit will be very similar to the permit issued in 2001.

The primary mitigation objectives associated with the Section 404 permit are to:

- preserve wetlands and supporting upland areas for wildlife habitat that are threatened by development;
- restore the hydrology to the area including a hydrologic link between the Jordan River and its floodplain;

The Legacy Nature Preserve neighborhood, detail.



- enhance mitigation habitats for increased biological production by removing human impacts and disturbances; and
- create slope wetlands with artesian wells.

PERMIT CONDITIONS

Essentially, the permit focuses on *preservation*; *restoration and enhancement*; and *creation* as mitigation measures that will improve the existing wetland functions and overall health of the wetland habitat. These measures have been incorporated into the LNP's mitigation package.

- *Preservation* – As open space in Davis County is being developed at the rate of about 700 acres per year, the LNP will provide permanent protection for 2,100 acres of wetland, riparian, and upland habitat. This habitat would be *preserved* in perpe-

tuity from encroaching development and would buffer adjacent areas important for wildlife in the Great Salt Lake ecosystem.

- *Restoration and Enhancement* – Mitigation for the Parkway Project will include restoration and enhancement of wetland functions that have been damaged as a result of past land-use activities. The areas reserved for mitigation have been subjected to years of human disturbance (e.g., draining, filling, dumping, and grazing) that have caused extensive hydrologic alterations to and degradation of wetland and upland habitats. *Restoration* within the LNP refers to hydrologic conveyance activities and minor land-alteration measures (such as weed control, removal of fill material, and water delivery) intended to restore hydrology to Jordan River floodplain areas. *Enhancement* refers to numerous mitigation measures that will facili-

tate the management of the LNP for the benefit of wildlife, including the removal of roads, filling drainage ditches and removing livestock grazing. *Enhancement and restoration* measures would improve wetland functions in the LNP as well as the overall productivity of wildlife habitats.

Due to its high-value wetland potential, the permit outlines specific enhancement actions for the Jordan River floodplain. The mitigation objectives for the area are to maintain habitat diversities similar to those currently represented in the depression and lacustrine hydrogeomorphic (HGM) wetland classes. Within the northern region of the floodplain, habitat types presently include unvegetated mudflat/pickleweed, covered mudflat, saltgrass/Baltic rush, and vegetation. By maintaining or improving the baseline conditions of these habitats, foraging, resting, and nesting habitat will be provided for the various species displaced by the Parkway.

The hydrology of the Jordan River floodplain will be restored and enhanced with a permanently controlled water delivery system. The upper playas of the LNP and the northern properties will be restored/enhanced and maintained in a natural condition.

- **Creation** – Additional wetlands will be *created* to provide added wetland functions for wildlife habitat and other uses. Working with the Corps, UDOT has developed conceptual plans for drilling a minimum of two artesian wells to create wetlands that would mitigate for the loss of

groundwater slope wetlands. The development of the artesian flow would create 12 acres of wetlands.

PERMIT PHASES

The Section 404 permit for the Legacy Parkway Project outlines a three-phase approach for the Legacy Nature Preserve, to be concurrent with construction and use of the Legacy Parkway.

Phase I – Mitigation Implementation:

This phase requires the completion of the foundational mitigation activities, such as acquiring land; removing debris, interior fencing, structures, and unnecessary roads and ditches; restoring relict channels; and installing water control structures. Phase I has been underway since 2001, and anticipated completion is late 2005.

Phase II – Adaptive Management:

This phase requires the implementation of the adaptive management plan and monitoring of implementation of the plan for approximately 5 years—until the LNP meets permit standards. Phase II will begin after the completion of Phase I and will last approximately five years. The anticipated duration of this phase is from late 2005 until 2011.

Phase III – Long-term Maintenance and Operation:

This phase requires that the site be maintained and managed in perpetuity by UDOT or a qualified third party. By this time, UDOT will have recorded a "Covenant and Use Restriction" with the Davis County Recorder for all mitigation lands. Phase III will begin after the completion of Phase II and will continue indefinitely.

WETLAND AND WILDLIFE IMPACTS

WETLANDS

As stated earlier, the proposed Parkway will directly impact 103 acres of wetlands. However, the original wetland analysis (begun in 1997) determined that 113 acres of wetlands within the right-of-way would be directly impacted and that wetlands within 1,000 feet of the right-of-way would be indirectly affected. The following information reflects the original analysis that suggests 113 acres would be directly disturbed. Table 1.1 provides an overview of wetland impacts for the Legacy Parkway.

In addition to the 113 acres of direct disturbance, the wetland analysis determined that 595 additional acres of wetlands would be *indirectly* impacted. Therefore, a total of 708 acres will be directly or indirectly disturbed as a result of the Parkway Project, and the impacts will require effective mitigation. The wetland cover types that will be impacted by the Parkway are as follows: marsh, wet meadow, playa, unconsolidated shore, and open water (see Appendix B for definitions).

Table 1.2 provides wetland impacts by wetland cover type as classified in 1997 when data for the jurisdictional wetlands delineation was collected.

According to Table 1.3, a total of 708 acres of direct (113 acres) and indirect (595 acres) jurisdictional wetlands would be impacted. Mitigation for the impacts of the Parkway will include 778 acres of delineated jurisdictional wetlands that will be preserved, enhanced, and restored—primarily wet meadow, marsh, and playa in wetland basins classified as lacustrine fringe.

The total of 778 acres requiring mitigation was derived through a functional assessment methodology and its associated mitigation ratios, as well as additional mitigation acreage added at the request of the EPA. The area ratio of total mitigation wetlands (778 acres) to direct wetlands impacted (103 acres) is 7.7:1.

WILDLIFE

The direct wildlife habitat loss as a result of the Parkway construction will total 587.8 acres (129.5 acres of wetland complex/riparian habitat and 458.3 acres of upland habitat; Table 1.4).

Table 1.1. Direct and Indirect Wetland Impacts by Acres

312-foot Right-of-Way	Alternative E
Acres within right-of-way	113
Acres indirectly affected	595
Source: Draft Mitigation Plan for the Legacy Nature Preserve.	

Table 1.2. Wetland Cover Types Impacted by Parkway

Wetland Type	Alternative E Impacts (acres)		
	Direct	Indirect	Total
Forested Wetland	0	0	0
Shrub-Scrub	0	0	0
Marsh	24	102	128
Wet Meadow	65	306	373
Playa	18	68	86
Unconsolidated Shore	0	47	47
Open Water	7	50	57
Total	113	595	708
Source: Draft Mitigation Plan for the Legacy Nature Preserve.			

Table 1.3. Mitigation by Area Impacted

Wetland Class	Legacy Parkway Impacts in Hectares (acres)			
	Direct	Indirect	Total	Mitigated ^a
Depressional	23 (57)	69 (170)	92 (222)	63 (157)
Slope	8 (19)	60 (149)	68 (169)	58 (141)
Lacustrine Fringe	15 (38)	102 (254)	119 (318)	195 (481)
Total	47 (113)	241 (595)	287 (708)	315 (778)
^a This does not include the creation of 12 acres of slope wetlands using artesian wells or the 8 acres of wetland physically restored. See Appendix B for definitions. Source: Draft Mitigation Plan for the Legacy Nature Preserve.				

According to the Draft Mitigation Plan for the LNP, the construction of the Parkway will contribute to cumulative habitat loss, habitat fragmentation, and noise effects on local wildlife populations, including migratory birds. However, direct habitat loss will be sufficiently mitigated through the preservation, creation, restoration and enhancement of wetland and uplands

within the LNP. While the Wildlife Impacts Analysis concluded that the impacts of the Parkway alone would not affect the long-term viability of any wildlife species in the Great Salt Lake ecosystem, it is the goal of UDOT and this document to guide the development and maintenance of quality wildlife habitats.

Table 1.4. Direct Wildlife Habitat Losses (Legacy Parkway Right-of-way)

Wildlife Habitat Type	Habitat Loss (acres)
Wetland/Riparian Habitats	
Wet Meadow	75.6
Emergent Marsh	24.2
Mudflat/Pickleweed	16.3
Open Water	9.6
Riparian	3.8
Total Wetland/Riparian Habitat	129.5*
Upland Habitats	
Pasture	201.8
Cropland	129.3
Salt Desert Scrub	127.2
Total Upland Habitat	458.3
*Includes delineated jurisdictional wetlands and other habitat types. Source: Draft Mitigation Plan for the Legacy Nature Preserve.	

ADAPTIVE MANAGEMENT PLAN DEVELOPMENT

In order to meet the mitigation requirements for the Legacy Parkway set forth in the Section 404 permit, UDOT is charged not only with creating the LNP but also with providing guidance for its ongoing and future management. The remainder of this document will outline the management goals for the LNP and provide future LNP managers with the direction necessary to maintain high-quality wildlife habitat within this unique portion of the Great Salt Lake's ecosystem.

The nearly 2,100-acre LNP contains various types of wetland and upland habitat that will require different management techniques. In order to effec-

tively manage the diverse land types, the LNP has been divided into five management areas:

1. Riverine
2. Evaporative Basins
3. Alkali Flats and Slope Wetlands
4. Wet Meadow
5. Farmington Bay

The details and unique features of each management area will be discussed later in this document.

This management plan is intended to be a dynamic document that will guide managers as they provide long-term maintenance of the LNP throughout Phase III. Based on the principles of adaptive management, this "living docu-

ment" may change and evolve over time. The adaptation and learning processes that occur as the LNP managers respond to information obtained through monitoring efforts will allow the adaptive management plan to be amended in order to meet the management area objectives.

However, it is important to note that while management techniques may evolve and change over time based on data analysis, there are several items that will not change. Specifically, the boundary lines, acreage, and LNP

guiding principles will remain unchanged throughout the management of the LNP.

COLLABORATIVE DESIGN TEAM (CDT)

UDOT established a Collaborative Design Team (CDT) in January 2005 to develop procedures for ongoing and future management of the 2,098-acre LNP. Members of the CDT worked closely with UDOT, providing guidance and expertise and, thus, shaping a comprehensive management plan that will provide regional benefit for species dependant on the Great Salt Lake ecosystem.

The Collaborative Design Team comprised the following individuals and organizations:

Bear River Bird Refuge, Al Trout

Farmington Bay Waterfowl Management Area, Rich Hansen

Friends of Great Salt Lake, Lynn de Freitas

**Foundation for the Provo-Jordan River Parkway/
Great Salt Lakekeeper, Jeff Salt**

Sierra Club, Marc Heilesen

The Nature Conservancy, Chris Brown

U.S. Army Corps of Engineers, Brooks Carter and Nancy Kang

U.S. Environmental Protection Agency – Region 8, Dave Ruiter

U.S. Fish and Wildlife Service, Nathan Darnall and Chris Witt

Utah Division of Wildlife Resources, Pam Kramer and Nancy Keate

Utah Department of Transportation, Sylvia Hartley

MISSION STATEMENT

The CDT has created a mission statement and guiding principles for the LNP, which have provided a framework for the development of adaptive and long-term management options for the LNP.

The Legacy Nature Preserve mission statement:

6. Monitor and manage invasive species to protect and preserve desirable native or naturalized species from deleterious effects.
7. Coordinate LNP adaptive management strategies with adjacent managed areas and land uses to protect into perpetuity, improve, and enhance overall habitat integrity of the Great Salt Lake ecosystem.

"The Legacy Nature Preserve provides in perpetuity quality wildlife habitats for mitigating impacts to wetlands and wildlife associated with the Legacy Parkway."

GUIDING PRINCIPLES

The LNP will use a scientifically based adaptive management approach to:

1. Meet all mitigation requirements detailed in the Supplemental EIS Mitigation Plan and Section 404 permit.
2. Protect, preserve, and enhance aquatic and aquatic-dependent resources present in the LNP.
3. Protect, preserve, and enhance habitat for Utah State Species of Concern in the LNP.
4. Protect, preserve, and mitigate any cultural resources present in the LNP.
5. Restore functional habitat for wildlife that is consistent with ecological potential and management capabilities.
8. Be proactive in the greater community to prevent impacts from external threats that would compromise the integrity of the LNP.
9. Provide opportunities for public education and outreach compatible with Guiding Principles 1–8 that enhance the visibility and image of the LNP, develop and maintain a sense of public stewardship, and create a better appreciation and awareness of the Great Salt Lake ecosystem.
10. Prohibit active recreation in the LNP.

COLLABORATIVE DESIGN PROCESS

From February through October 2005, the CDT met monthly to design and shape the management plan. The CDT's extensive knowledge of the important features and actions necessary to ensure wetland and wildlife habitat preservation and restoration in the LNP

provided a strong foundation for the development of the management plan. The monthly meetings allowed resource specialists from various government entities and conservation groups to discuss the prominent issues for each management area of the LNP and the most effective actions to address the issues.

Once the guiding principles and management area objectives were developed, the CDT group divided into sub-committees in order to provide detailed management actions for each management area. Individuals with a specific interest in or knowledge of vegetation, wildlife, water, and/or education participated in monthly sub-committee meetings, in addition to the larger CDT meetings, fleshing out the actions necessary to meet the LNP guiding principles.

In order to involve and educate the public about the LNP, the CDT hosted two events providing information about the LNP. In early May, the CDT had a booth at the 7th Annual Great Salt Lake Bird Festival. There, the public was invited to provide input regarding the

management of the LNP and sign up for tours. While there was interest in touring the LNP (30 people signed up), the CDT did not receive any public comment during this event.

The CDT also hosted an open house in May 2005. The open house was designed to maximize community learning and involvement. Twelve display boards gave an overview of the Great Salt Lake ecosystem and the Legacy Nature Preserve, introduced and outlined the mission statement and goals of the CDT, reviewed the global significance of the Great Salt Lake ecosystem, explained the process of land acquisition and restoration efforts for the LNP, and reviewed the Section 404 permit process and approach. Members of the CDT gave personal tours of the informational boards and answered questions that pertained to the LNP and the Great Salt Lake.

During the open house, the public was invited to share how they believed the LNP should be managed. The public responses regarding public access and education in the LNP were reviewed by the CDT and incorporated into this management plan as appropriate. Details on the results of the open house "visioning" exercise are discussed in Chapter 3.



The Great Salt Lake area is an overwintering spot for bald eagles, and the LNP contains both bald eagle nests and roosts.

CHAPTER TWO

2

DEFINITION OF ADAPTIVE MANAGEMENT PROCESS OF ADAPTIVE MANAGEMENT IN CONCLUSION



DEFINITION OF ADAPTIVE MANAGEMENT

Adaptive management is based upon the premise that managed natural systems are complex and unpredictable. According to Margoluis and Salafsky (1998), adaptive management incorporates research into conservation practices. Specifically, it is the integration of design, management, and monitoring to systematically *test assumptions* in order to *adapt* and *learn*.

This definition can be expanded and applied to the LNP as follows:

- a. *Testing assumptions* means to systematically try different actions to achieve a desired outcome. This is different than a random trial-and-error process. The manager should develop a specific set of assumptions about what is occurring on the LNP and what actions might be used to affect these events. Then the actions should be implemented and results monitored to see how they compare to those predicted by the original assumptions. The key here is to develop an understanding of not only which actions work and which do not, but also why.
- b. *Adapting* means to take action to improve LNP conditions based on the results of monitoring. If management actions do not achieve the expected results, it is because the assumptions were wrong, management actions were poorly executed, the on-site conditions have changed, monitoring was faulty, or some combination of these problems. Adaptation requires changing assumptions and actions to respond to new information obtained through monitoring efforts.
- c. *Learning* requires systematic documentation of the management process and results achieved. This documentation can help the manager avoid making the same mistakes in the future. It can also enable other management efforts in the Great Salt Lake ecosystem to benefit from experiences at the LNP.

PROCESS OF ADAPTIVE MANAGEMENT

The adaptive management process, based upon Margoluis and Salafsky's approach (1998) consists of several steps that, when followed, will provide a dynamic and responsive management approach for complex systems found on the Legacy Nature Preserve and the Great Salt Lake ecosystem. The CDT has already successfully completed several of these steps.

DEFINE THE MISSION OF THE LNP

This is the first critical step that identifies overarching goals for the LNP. The mission statement developed by the CDT as noted in Chapter One provides context and direction for all subsequent activities on the LNP.

DEVELOP A CONCEPTUAL MODEL OF THE LNP

Once the overall mission for the LNP was clear, the Preserve was characterized by assessing the ecological conditions and determining major threats to that underpinning goal. There are many ecological relationships and intricacies that should be understood or at least identified in order to manage the LNP with any hope of success. It is also important to understand the cultural, social, economic, and political systems that influence surrounding land uses and the behavior of stakeholders. All of these different ecological and human factors interact with one another in dynamic and unpredictable ways.

Getting an understanding of the ecosystem to be managed is typically done through the development of a model. Models are simplified abstractions of reality and are important to help organize information and to provide a framework for comparing alternative courses of action. Models also provide a vehicle to work out a view of what is being managed and how the management should be done.

A good conceptual model will present a picture of the situation at the LNP, showing the assumed linkages between the various direct and indirect pressures that affect conditions. The heart of adaptive management is testing these assumptions and, in the process, gaining a better understanding of the LNP. Through their collective experience and dialog, the CDT developed a greater understanding of the LNP as a whole and its significance as a part of the Greater Salt Lake ecosystem. Though implicit, this model or holistic understanding was integrated into each discussion regarding specific resource issues and needs.

DEVELOP A MANAGEMENT PLAN TO MAXIMIZE RESULTS AND LEARNING

After developing a conceptual model, an adaptive management approach involves figuring out specific objectives and actions to be taken. At this point the conceptual model should become something more tangible. It should identify objectives, external threats, and other factors that affect the overall objectives. The key here is to develop a management plan that outlines the issues that need to be addressed and the specific actions that will be used to

change them. The CDT has identified many management actions specific to different Management Areas, but the true development of actions is really an iterative process that will play out as results are monitored and the conceptual model is refined.

DEVELOP A MONITORING PLAN TO TEST ASSUMPTIONS

Once appropriate management actions have been selected, thought needs to be given to monitoring the assumptions (linkages) behind the actions. Monitoring should focus on key indicators, so that time and money are not wasted on gathering and analyzing extraneous data.

There are two primary reasons for monitoring a project. The first is to convince others (e.g., regulatory agencies, stakeholders, public) that the management objectives are being met. The second is to learn whether the management actions are working, so that corrective action may be taken if needed. The purpose of monitoring is to determine whether actions are effective and to learn how to improve.

Assumptions should be stated in a clear and specific fashion so that it is easier to determine what data are needed in order to test them. This includes designing the appropriate comparison and selecting the right indicators to measure. Too many data on unrelated topics may actually make it harder to find and use the specific bits of data needed to test key assumptions. The CDT provides general guidance in this document regarding appropriate indicators and monitoring protocols to ensure

the appropriate foundational data are collected. However, the LNP Manager will necessarily work much of the detailed monitoring needs out during implementation of Phase II.

IMPLEMENT MANAGEMENT AND MONITORING PLANS

Up until this point, the steps in the process of adaptive management have involved planning: developing a mission statement, defining a conceptual model, creating a management plan outlining specific actions, and creating a monitoring plan. But adaptive management is not a theoretical exercise. Instead, it is fundamentally about taking action. As a result, the most critical step in the entire process involves implementing the management plan. This will occur over the five years of Phase II.

ANALYZE DATA AND COMMUNICATE RESULTS

All of the data that have been collected need to be used for the future management of the LNP. Data should be analyzed on a regular basis so that useful information can be extracted and applied to the strategic management of the LNP. This analysis will primarily occur during Phase II. Findings should be carefully documented, so that a solid basis exists for future management decisions. These results will be especially critical when the LNP changes hands.

USE RESULTS TO ADAPT AND LEARN

A time will come for the results to be used to adapt and learn. To do so, results must be compared to the original

conceptual understanding of the LNP and the assumptions that were tested experimentally. If the experiments turn out exactly as predicted, then the original assumptions are confirmed. However, it is likely that the experiments will not have turned out exactly as predicted. In this case, the LNP Manager will need to use these results to change the timing or intensity of the action, or the entire action altogether.

Results should also be used to change and refine the conceptual model. This captures important lessons learned and incorporates them into the institutional knowledge base for the LNP. This may lead to new assumptions to be tested. This iterative cycle will continue, refining management actions and building a

better understanding of LNP resources, and ultimately, leading to better conservation "in perpetuity."

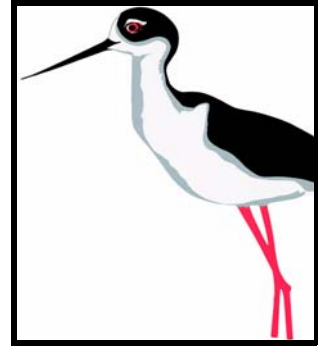
IN CONCLUSION

The adaptive management approach outlined above was used to develop the content in Chapter Three. The interactive and collaborative process integrated the thoughts and concerns of many stakeholder groups to identify key issues, frame management objectives, and develop management actions. As it continues to be implemented in Phases II and III, this adaptive management process will continue to provide an increasingly clear picture of the LNP's unique attributes and dynamics and its potential for the future.

CHAPTER THREE

3

LNP OVERVIEW MANAGEMENT AREA ISSUES AND OBJECTIVES EDUCATION AND PUBLIC ACCESS



LNP OVERVIEW

Located within the Great Salt Lake ecosystem, the Legacy Nature Preserve is adjacent to the southeast shore of the Great Salt Lake. Unique features of this shallow, saline lake produce abundant brine shrimp and brine fly resources. These exceptional characteristics, along with a mosaic of adjacent wetland complexes, make the Great Salt Lake an internationally significant site for millions of migratory birds each year.

Since the mid-1800s, the land immediately east of the lake has been disturbed by agricultural practices, including heavy livestock grazing. The urban development began along the foothills of the Wasatch Mountains and has continued westward to the Great Salt Lake ecosystem. Current land use around the area is primarily agricultural and residential with some light industrial and commercial operations.

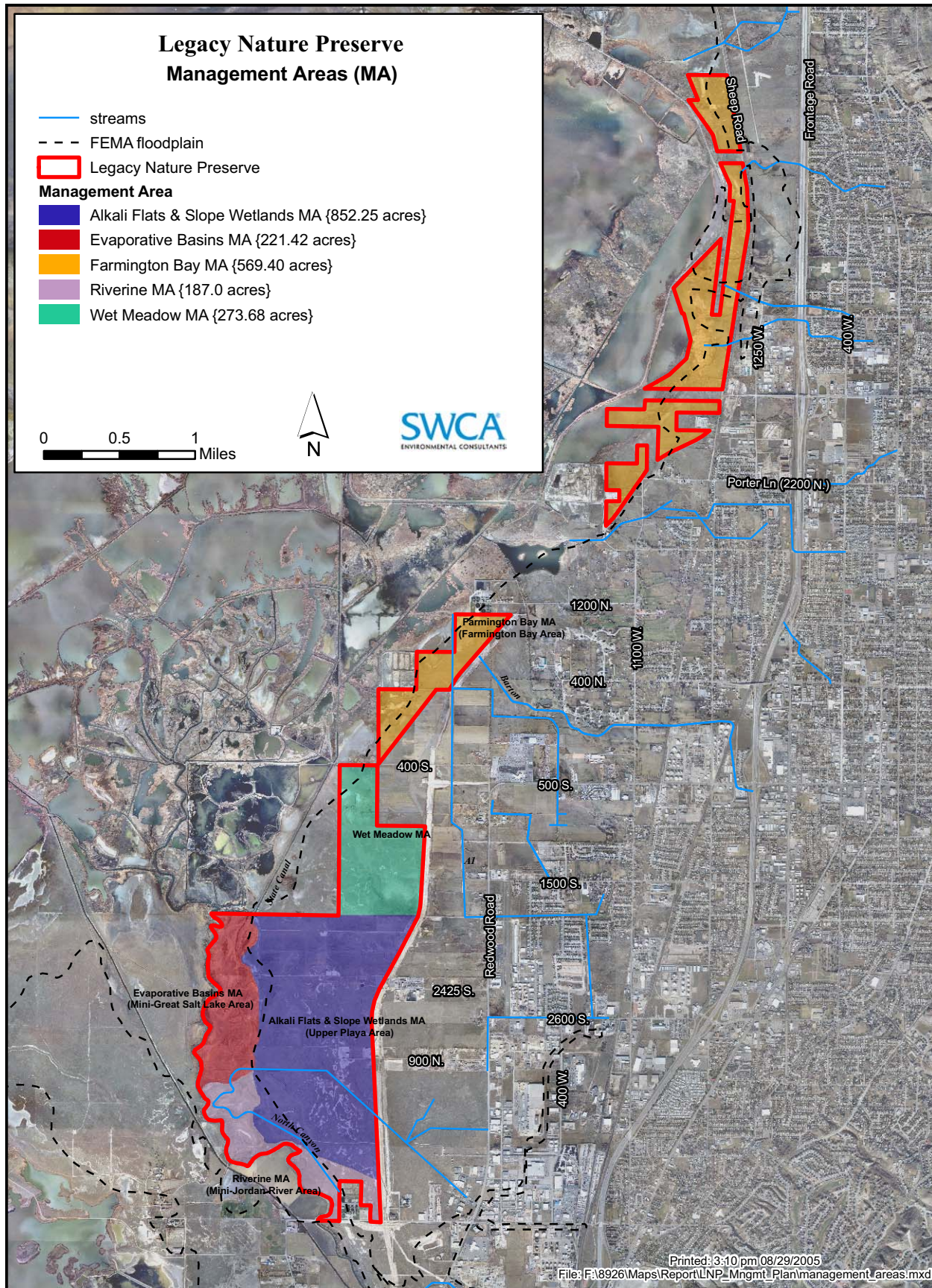
The vegetation in the LNP comprises wetland and upland communities. The wetland communities contain wet meadow, emergent

marshes, riparian areas, and saline playads. The uplands in the area consist of pasture, cropland and salt desert scrub. Many noxious and invasive species are found in the disturbed uplands and some wetland areas within the LNP.

Several existing water sources sustain the wetlands in the area. Water is supplied to the LNP by the Jordan River and its small tributaries, fluctuations in Great Salt Lake levels, groundwater from the shallow water table, shallow aquifers, stormwater and agricultural runoff, and direct precipitation. Pollutants such as sediments, heavy metals, oils, and organic waste from livestock and humans have been found in water that flows through the LNP.



Historical
feature
from the
LNP's
agricultural
past.



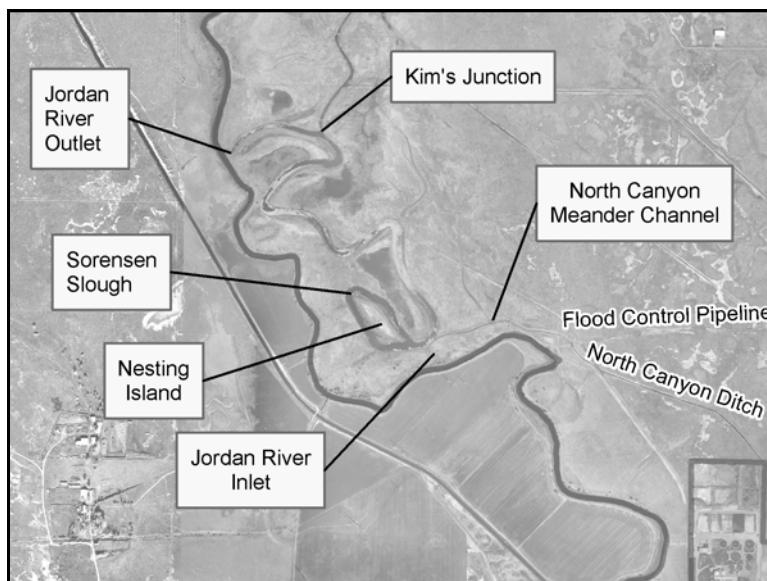
Legacy Nature Preserve management areas.

LEGACY NATURE PRESERVE MANAGEMENT AREAS

RIVERINE MANAGEMENT AREA – 187.00 ACRES

The Riverine Management Area (RMA) lies below the 100-year Federal Emergency Management Agency (FEMA) floodplain line elevation for the Great Salt Lake (4,212 feet) and is therefore subject to inundation from the Great Salt Lake when the lake approaches historically high water levels. The depth of the water within the RMA can be controlled at the inlets and outlets. The ditches located in the Alkali Flats and Slope Wetlands MA, to the northeast of the RMA, may cause the groundwater levels to rise and recharge in the RMA. The main water source for the RMA is from North Canyon and Hooper's Draw with supplemental water from the Jordan River.

Overview of the Riverine Management Area.



This MA also lies within the historic floodplain of the Jordan River. The modifications to the river, including the construction of dikes, diversions and channelizations, have significantly altered the river's natural characteristics. Due to the barrier from levees and dikes, the river no longer floods naturally into the relic channel meanders and oxbows throughout the MA. Surface runoff and back-flooding of the State Canal have resulted in the seasonal accumulation of water into these channels. In the fall of 2004, a berm along the State Canal was constructed to prevent uncontrolled back-flooding and runoff into the RMA.

Prior to the alteration of its banks, the Jordan River floodplain was likely subject to natural processes driven by flood/scour, fluvial dynamism, and sedimentation. These riverine processes rarely occur at the present time; however, the processes likely resulted in periodic development and then loss of woody riparian and emergent marsh habitat for wildlife coincidental with cyclical low and high Great Salt Lake water levels, respectively.

According to Utah's Department of Environmental Quality, Division of Water Quality 2004 303(d) List of Impaired Waters, the current Jordan River water quality parameters meet the beneficial use classification 3C: Protected for non-game fish and other aquatic wildlife, including the necessary organisms and their food chain.

Today, riparian and emergent marsh habitat for wildlife is minimal to absent in the RMA. Desirable riparian vegetation has been significantly disturbed and is limited to the banks of the Jordan River (consisting primarily of coyote willow) and stands of emergent vegetation can be found along the Jordan River banks and its relict channels within the floodplain. Undesirable species such as tamarisk, Russian olive, and other weedy annuals are numerous along the banks of the river.



Riparian habitat along the banks of the Jordan River.

Many of the mitigation activities occurring in the LNP are located in or near the RMA. In 2003 the North Canyon tributary (consisting of the Flood Control Pipeline/Drain [FC Drain] and North Canyon Meander Channel) was constructed to allow for the restoration of an oxbow system. The water diverted from the North Canyon Meander Channel, FC Drain, and Jordan River will allow the LNP Manager to use the best available water in varying quantities in order to meet the goals of the Adaptive Management Plan. At the outlet of the tributary, weir structures have been constructed to provide water surface elevation control.

The FC Drain, located in the RMA, was constructed in 2003. This storm drain carries up to 132 cfs of urban drainage from east of the Legacy Parkway right-of-way to the Jordan River in two 48-inch, buried pipelines. The pipes were installed with tight environmental con-

straints that did not allow any impacts on wetlands; disturbance was limited to the upland areas, an existing road, and a ditch scar. Upon completion of the FC drain construction, the existing road was fully removed, historical hydrology was restored, contours to accommodate the expansion of wetlands were made where possible, and the alignment was seeded with native species.

Within the RMA, a Jordan River tributary (North Canyon Meander Channel) has been restored to a more natural course and is part of the approximately 7,750 feet of stream channel mitigation within the LNP. Additionally, the newly constructed tributary includes a nesting island surrounded by 20 meters of open channel to protect nesting birds from predators. Much of the fill from the oxbow channels in the area was used to build up the island.

The North Canyon Water Supply System was constructed in 2003 and 2004. The majority of the system's 20-inch pipeline lies outside of the LNP, but the RMA and Alkali Flats and Slope Wetlands MA were impacted by its construction. The pipeline can carry up to 20 cfs. The water from the pipeline empties into an existing drainage channel in the RMA.

As part of the mitigation requirements, the existing drainage channel has been slightly modified by adding meanders. The meanders restore and/or avoid existing wetlands and maximize management flexibility. The new meandering channel is approximately 1,280 meters; the depth ranges from 0.25 to 1.00 meters. The channel will allow for greater water delivery into the tributary and Evaporative Basins MA, as well as the creation of a small creek that will flow year round. The meandering channel has been blended into the natural terrain and the disturbed areas have been reseeded with native vegetation.

An archaeological site, 42Dv72, has been located in the RMA. It is a National Register for Historic Places (NRHP)-eligible prehistoric artifact scatter. There is an access road located on the east side of the Jordan River that is very close to the site boundary.

RMA ISSUES

The overall goal for this area is to restore hydrology to the historic Jordan River floodplain, which provides perennial flows in the riverine channel meanders and oxbows. The associated

uplands in the RMA must be maintained and enhanced in order to support the slough and riparian area.

RMA OBJECTIVES

RMA-1: PROTECT AND ENHANCE WATER QUALITY.

Intent/Purpose

Wildlife, including the necessary organisms and their food chain, must be protected. All inputs and discharges to the RMA must be considered and managed effectively. Stormwater flows from industrial sites, subdivisions and other impervious surfaces must be identified. Water quality should be regularly monitored on a basis frequent enough to provide meaningful data for management.

Actions

- Routinely monitor and control inflows to ensure that water quality meets the LNP stormwater standard, to be determined in the Comprehensive Water Management Plan (CWMP).
- Proactively work with surrounding communities, developers, and local governments to prevent pollutants from entering the LNP through stormwater discharges; control the effects of illicit discharges and accidental spills; and prevent overflow from the Jordan River.
- Develop a long-term strategic relationship with communities to ensure water entering the RMA will meet minimum standards for wildlife habitat requirements.
- Develop a Comprehensive Water Management Plan (CWMP).

RMA-2: ENSURE ADEQUATE QUANTITY OF WATER IS AVAILABLE TO MEET RMA OBJECTIVES.

Intent/Purpose

Water rights for the LNP must be protected and enforced in order to maintain a high-quality Preserve.

Actions

- Protect and enforce the full measure of all secured water rights within the LNP.
- Determine the full measure of all secured water rights, as delivered, through direct measurement at the point of diversion.
- Maintain the off-site water conveyance system so that delivery of water is maximized.

RMA-3: PROTECT, MAINTAIN, AND ENHANCE THE SORENSON SLOUGH AND THE NORTH CANYON MEANDER CHANNEL AS RIPARIAN AREAS TO BENEFIT RIPARIAN-DEPENDENT WILDLIFE.

Intent/Purpose

The North Canyon Meander Channel system that provides water to Sorenson Slough is effectively an open ditch. The ditch needs to be managed as a riparian area to function as mitigation for the Parkway's riparian crossings. The fluvial character of the slough needs to be maintained while allowing limited channel migration. The floodplain and uplands associated with the riparian area are also key elements of this MA and should be managed to provide diversity of habitat types.

Actions

- Develop a Comprehensive Water Management Plan (CWMP) that effectively manages seasonal and annual variations in flow delivered to the RMA.
- Control excessive sedimentation.
- Maintain appropriate channel bottom depth.
- Allow aquatic mammals, amphibians and fish to colonize the RMA to an extent consistent with overall LNP guiding principles.
- Actively control and prevent the spread of undesirable species via the implementation of appropriate eradication techniques.
- Revegetate wetlands and uplands with desirable species.

RMA-4: MINIMIZE PESTICIDE APPLICATIONS ON THE RMA.

Intent/Purpose

Given the ecology of the ecosystem and its proximity to urban areas, ongoing mosquito abatement programs are important. However, the LNP is a sensitive environment that requires a minimally intrusive approach. Effects of pesticides on aquatic insects, amphibians, fish, and other animals are not currently well understood, so extreme caution should be exercised in the application of these chemicals and the access needed to do it. The pesticide application process, via motorized vehicles, will be permitted in the LNP, provided access does not lead to the spread of noxious weeds or other undesirable impacts.

Actions

- Regularly coordinate least invasive applications through the Davis County Mosquito Abatement Program.
- Coordinate appropriate dispersal schedules based on sensitive areas, hydrologic flows, and avian reproductive cycles.
- Coordinate motorized vehicle access with LNP Manager to ensure vehicles remain on existing roads whenever possible.
- Ensure application methods do not create unwanted effects, including negative impacts to habitat, disturbance to nesting and migrating birds and other wildlife, or the spread of noxious weeds.

RMA-5: PROTECT THE ARCHAEOLOGICAL SITE.

Intent/Purpose

Archaeological sites are important to our understanding of the prehistory and history of the region. Certain sites are considered significant and have been recommended to be eligible for the NRHP. These sites are protected by law. In order to limit access and potential vandalism, the location of NRHP-eligible archaeological sites should be confidential information and not for public knowledge.

Actions

- Protect the locational data of Site 42Dv72.
- Limit access to the archaeological site.

- Monitor for cultural resources during construction activities until the enhancement phase is completed.
- Subsequent to construction phase, periodically monitor archaeological sites to ensure that they are not being vandalized.

EVAPORATIVE BASINS MANAGEMENT AREA – 221.42 ACRES

Although the Evaporative Basins Management Area (EBMA) lies within the historic floodplain of the Jordan River, the construction of dikes along the river has eliminated the natural flooding pattern of the Jordan River floodplain. Water sources for the EBMA include North Canyon in the RMA, the Jordan River inlets to identified basins, precipitation within the areas, and possibly the Great Salt Lake, as the EBMA lies within the lake's 100-year floodplain. Also, channels from the RMA periodically feed the depressional basins in the area.

During years when the lake is at high levels, this area is generally inundated. After the water recedes below the flood stage, the remaining water gradually evaporates from the shallow basins, resulting in a saline, vegetation-free environment. However, agricultural land use practices during the last 100 years and back-flooding and leaching of surface salts from the State Canal during the fall and winter months have lowered soil salinity in the basins. As a result, the soil chemistry could be insufficient to maintain vegetation-free mudflat/shallow water habitat that is beneficial for shorebird use.



Mudflat/
pickleweed
habitat, in dry
(left) and
slightly flooded
stages (right).

Within the last six years, some of the basins within the EBMA have gradually filled with vegetation, as salt has become less of a limiting factor, ranging from the most salt-tolerant species, pickleweed, to non-salt-tolerant grasses and forbs. In the fall of 2004 a berm along the State Canal was constructed in the northeastern corner of the EBMA to prevent uncontrolled back-flooding.

The absence of periodic flooding by the lake or other natural hydrologic influences has fostered a shift in vegetative species composition away from barren or partial pickleweed vegetated mudflats because salts are not collecting on surface soils through evaporative and capillary processes. To restore a hydrologic connection to the Jordan River floodplain, periodic flooding of the terminal basins (i.e., annually during the early spring or less frequently) should occur in the EBMA. The flooding will restore habitat for migratory and resident shorebirds in basins that still contain salts and are relatively vegetation free or partially covered with pickleweed. By wetting the soils in the early spring and allowing the water to evaporate, macroinvertebrate communities will become established along the edge

of the wetted soil and receding water serving as an important food base for the birds. The other basins in the floodplain may need restoration as their soil salinities are low and organic soils have accumulated.

Restoration of these parameters is critical before they will retain salt and mineral contents, sustain adequate soil salinities through capillary and evaporative processes, and function as a vegetation-free mudflat/shallow water habitat.

There is one archaeological site located in the EBMA. Site 42Dv103, an historic sewer line, spans the EBMA and extends into the Alkali Flats and Slope Wetlands MA. The site is recommended as not eligible for the NRHP.

EBMA ISSUES

One of the primary issues is to determine and maintain appropriate salinity levels in the basins. Once the range of soil salinities necessary for driving the system is understood, management actions (e.g., periodic inundation, addition of salts, removal of organic soils) can be taken. The ability to inundate the basins at an appropriate

Periodic flooding will restore habitat for migratory and resident shorebirds.



time and frequency is important in this area. It is anticipated that this management area may be the most difficult to manage, given the unpredictable flow of water into this area from surrounding management areas. Given the variety of hydrologic conditions that may occur in this area, the manager should retain flexibility to meet EBMA objectives and examine additional water flows as well as minimizing flows if necessary.

EBMA OBJECTIVES

EBMA-1: PROTECT AND ENHANCE WATER QUALITY.

Intent/Purpose

The main priorities in this MA are to provide habitat for waterbirds and to protect aquatic wildlife, including the necessary organisms and their food chain. When using the terms "protect and enhance" in reference to water quality, it is normally assumed that high-quality water is relatively free of dissolved solids. However, that is not the case for the EBMA, a terminal (or closed) basin that is dependent on salt. High total dissolved solids (TDS) and

perhaps some exceedence of temperature and dissolved oxygen (DO) reference targets in this EBMA do not conflict with the function of the EBMA in optimizing saline invertebrate community production and shorebird foraging. Given the likely fluctuation in temperature and DO, the manager should still monitor these parameters along with pH to ensure that the pH of each area doesn't become too high for healthy macroinvertebrate production. The manager will also need to monitor and protect water quality from contaminants (e.g., lead, selenium, mercury, nutrients, floating debris, oil, toxins, etc.). Stormwater will not likely be a concern in the EBMA, since incoming water will travel through the RMA via the Jordan River.

Actions

- Monitor surface flows and groundwater to ensure water quality meets the EBMA objectives.
- Manage the area to ensure the characteristics of an evaporative basin.
- Proactively work with surrounding communities, developers, and local governments to control the effects of

illicit discharges and accidental spills and prevent overflow from the Jordan River.

- Develop a long-term strategic relationship with communities to ensure water entering the EBMA will meet minimum standards for wildlife habitat requirements by allowing for the accumulation of salts and maintaining an appropriate salinity range in the evaporative basins.
- Develop a Comprehensive Water Management Plan (CWMP).

EBMA-2: ENSURE ADEQUATE QUANTITY OF WATER IS AVAILABLE TO MEET EBMA OBJECTIVES.

Intent/Purpose

Water rights for the LNP must be protected and enforced in order to maintain a high-quality Preserve.

Action

- Maintain the water conveyance system so that delivery of water to the EBMA is optimized.

EBMA-3: PROVIDE DYNAMIC HABITAT FOR SHOREBIRDS.

Intent/Purpose

Natural hydrological cycles must be mimicked as necessary to optimize invertebrate production for the shorebird food base. Care must be taken to monitor optimum flood depths. Too much water may inundate nests or allow emergent vegetation to grow. Habitat should be maintained to function as a resting, nesting, and staging area for resident and migratory birds. To

maintain the dynamic complexity of the shorebird habitat, different actions throughout the year may be necessary to mimic seasonal changes.

Actions

- Maintain mudflat/shallow water habitat that meets or exceeds the baseline conditions of the permit requirements.
- Mimic seasonal flows by providing sufficient hydrologic variability (e.g., inundation and drawdown). Ensure the shoreline is continually changing, maintaining the foodbase for shorebirds, through the use of structural (impoundment, diversions) and non-structural (direct precipitation, evaporation) practices.
- Establish desired water levels within mudflat/shallow water habitat areas similar to other managed and referenced basins (playas) and implement through appropriate structural practices.
- Develop target salinity levels using reference playas identified in the CWMP.
- Maintain appropriate soil chemistry and targeted salinity levels by controlling flows and salt loadings into the EBMA.
- Actively control and prevent the spread of undesirable species through the implementation of appropriate eradication techniques.

EBMA-4: MINIMIZE PESTICIDE APPLICATIONS ON THE MA.

Intent/Purpose

Given the ecology of the ecosystem and its proximity to urban areas, ongoing mosquito abatement programs are important. However, the LNP is a sensitive environment that requires a minimally intrusive approach. Effects of pesticides on aquatic insects, amphibians, fish, and other animals are not currently well understood, so extreme caution should be exercised in the application of these chemicals and the access needed to do it. The pesticide application process, via motorized vehicles, will be permitted in the LNP, provided access does not lead to the spread of noxious weeds or other undesirable impacts.

Actions

- Regularly coordinate least invasive applications through the Davis County Mosquito Abatement Program.
- Coordinate appropriate dispersal schedules based on sensitive areas, hydrologic flows, and avian reproductive cycles.

- Coordinate motorized vehicle access with LNP Manager to ensure vehicles remain on existing roads whenever possible.
- Ensure application methods do not create unwanted effects, including negative impacts to habitat, disturbance to nesting and migrating birds and other wildlife, or the spread of noxious weeds.

**ALKALI FLATS AND SLOPE WETLANDS
MANAGEMENT AREA – 852.25
ACRES**

The Alkali Flats and Slope Wetlands Management Area (AFMA) consists primarily of ancient lake-bottom depressions with alkaline soils fringed by iodine bush, greasewood, and grasses. Many of the alkali flats maintain populations of seepweed as opposed to pickleweed, which is more tolerant of saline soils associated with playas. The edge of the 100-year floodplain bisects the AFMA. Accordingly, the AFMA provides habitat for shorebirds during times of high water. Several ditches and drains are located throughout the AFMA and appear to drain adjacent wetlands and lower the naturally shallow water table. The AFMA has been degraded through the alteration of natural hydrology, overgrazing, invasion of non-native vegetation, habitat frag-



The detention basin, facing west. The alkali flats are south of this area.

mentation, and the clearing of vegetation for dirt roads and other infrastructure. In order to improve habitat for populations of shrub- and ground-nesting wildlife, three unused ditches that previously drained shallow groundwater were filled in 2004, including the North Canyon Ditch, Cudahy Ditch, and a ditch south of the Swallow Barn. An existing ditch that connects to the North Canyon Ditch was left partially open to provide habitat for burrowing owls previously sighted in the area.

To further improve the wildlife habitat in the AFMA and to satisfy mitigation requirements set forth in the Section 404 permit, a minimum of two artesian wells will be drilled to create slope wetlands in areas that won't affect the alkali flats. The wells will have valves to control flows, and the overland flows will be distributed in a sheet flow fashion to avoid channelization. Other than the proposed wells, the sources of water to this area will continue to be precipitation and tailwater from the Woods Cross detention basin.

Five archaeological sites are located in the AFMA: 42Dv80, a prehistoric artifact scatter, 42Dv91, a historic water control feature, 42Dv98, a prehistoric lithic and ceramic scatter/historic trash scatter, 42Dv102, a historic trash scatter, and 42Dv103, a historic sewer line that extends from the EBMA into the AFMA. Sites 42DV80 and 42Dv98 have been recommended as eligible for the NRHP.

AFMA ISSUES

A minimum of two artesian wells will be drilled on existing uplands for wetlands creation. The manager must ensure that

sheet flow from the wells does not negatively impact adjacent management areas, particularly the EBMA, which relies on a careful balance of flooding and evaporation to maintain appropriate soil salinity.

Due to past land uses, this MA is not as biologically productive as it may have been historically, but offers sufficient cover and forage for wildlife. It contains a large amount of undesirable plant species. Restoration efforts should weigh the benefits and costs of altering existing habitat. Restoration efforts to the playas and uplands in this MA should be carefully implemented in phases. The land within this area is at the highest elevation in the LNP; therefore, it provides critical habitat during high-water periods.

AFMA OBJECTIVES

AFMA-1: PROTECT AND ENHANCE WATER QUALITY.

Intent/Purpose

Wildlife, including the necessary organisms and their food chain, must be protected.

Actions

- Monitor water quality to ensure water meets the LNP stormwater standards, to be determined in the Comprehensive Water Management Plan (CWMP).
- Proactively work with surrounding communities, developers, and local governments to prevent pollutants from entering the LNP through stormwater discharges; control the effects of illicit discharges and acci-

dental spills; and provide a means to bypass large storm events through or around the AFMA so that flows do not damage structures or impair the alkali flats.

- Develop a long-term strategic relationship with communities to ensure water entering the AFMA will meet minimum standards for wildlife habitat requirements.
- Develop a Comprehensive Water Management Plan (CWMP).

AFMA-2: ENSURE ADEQUATE QUANTITY OF WATER IS AVAILABLE TO MEET AFMA OBJECTIVES.

Intent/Purpose

Water rights for the LNP must be protected and enforced in order to maintain a high-quality Preserve.

Actions

- Determine the full measure of all secured water rights, as delivered, through direct measurement at the point of diversion (i.e., wells).
- Protect and enforce the full measure of all secured water rights within the LNP.
- Maintain the water conveyance system so that delivery of water is maximized.

AFMA-3: CREATE AND MAINTAIN AT LEAST 12 ACRES OF NEW GROUNDWATER-SLOPE WETLANDS.

Intent/Purpose

The creation of 12 acres of slope wetlands is mandated in the Section 404 permit as mitigation for the Parkway.

However, the mandated 12 acres do not all need to be created within the AFMA. Based on the manager's discretion and ecological appropriateness, a portion of the mitigation wetlands may also be created in other MAs. Artesian wells will likely be used to provide water for the new wetlands. Should wells prove unfeasible, another means to replace this wetland function shall be implemented. The new supply of groundwater to the area requires that sheet flow must be monitored so that excess water does not flow into the EBMA.

Actions

- Identify appropriate area(s) for the creation of the wetlands.
- Develop a sufficient water source to sustain wetlands.
- Distribute overland flows evenly to avoid channelization, through appropriate identification and construction of areas suitable to sustain wetlands.

AFMA-4: IMPROVE UPLAND AND WETLAND HABITAT.

Intent/Purpose

Habitat should be maintained to function as a resting, nesting, and staging area for resident and migratory birds. Upland habitat should be added to this area without bringing in undesirable species.

Actions

- Maintain mudflat/shallow water habitat that meets or exceeds the baseline conditions of the permit requirements.

- Actively control and prevent the spread of undesirable species through the implementation of appropriate eradication techniques.
- Re-seed or re-vegetate with native or desirable non-native species after disturbances (e.g., after natural or man-made disturbance).
- Restore upland habitat.
- Maintain alkali flats.
- Coordinate motorized vehicle access with LNP Manager to ensure vehicles remain on existing roads whenever possible.
- Ensure application methods do not create unwanted effects, including negative impacts to habitat, disturbance to nesting and migrating birds and other wildlife, or the spread of noxious weeds.

AFMA-5: MINIMIZE PESTICIDE APPLICATIONS ON THE AFMA.

Intent/Purpose

Given the ecology of the ecosystem and its proximity to urban areas, ongoing mosquito abatement programs are important. However, the LNP is a sensitive environment that requires a minimally intrusive approach. Effects of pesticides on aquatic insects, amphibians, fish, and other animals are not currently well understood, so extreme caution should be exercised in the application of these chemicals and the access needed to do it. The pesticide application process, via motorized vehicles, will be permitted in the LNP, provided access does not lead to the spread of noxious weeds or other undesirable impacts.

Actions

- Regularly coordinate least invasive applications through the Davis County Mosquito Abatement Program.
- Coordinate appropriate dispersal schedules based on sensitive areas, hydrologic flows, and avian reproductive cycles.

AFMA-6: PROTECT THE ARCHAEOLOGICAL SITES.

Intent/Purpose

Archaeological sites are important to our understanding of the prehistory and history of the region. Certain sites are considered significant and have been recommended to be eligible for the NRHP. These sites are protected by law. In order to limit access and potential vandalism, the location of NRHP-eligible archaeological sites should be confidential information and not for public knowledge.

Actions

- Protect the locational data of the archaeological sites in the AFMA.
- Limit access to archaeological sites in the AFMA.
- Monitor for cultural resources during construction activities until the enhancement phase is completed.
- Subsequent to construction phase, periodically monitor archaeological sites to ensure that they are not being vandalized.

WET MEADOW MANAGEMENT AREA – 273.68 ACRES

The Wet Meadow Management Area (WMMA) is located adjacent to and north of the AFMA. The major water source for this area was artificially supplied through irrigation diversions and artesian wells; however, this water source was discontinued with the change of land ownership and use outside of the LNP boundaries, from agricultural to residential development.

Wet meadows in the WMMA occur within depressions and slope areas and consist of vegetation that tolerates being inundated for a portion of the growing season. The area is dominated by Arctic rush, spike rush, alkali bulrush, and salt-grass. Vegetation will vary depending on soil and groundwater salinities. The northwest portion of the area is within the Great Salt Lake floodplain. The wildlife habitat of other areas in the WMMA has been degraded during the last 50 to 100 years, via alteration of natural hydrology, overgrazing, invasion of non-native vegetation, habitat fragmentation, and clearing of vegetation for dirt roads and other infrastructure.

No archaeological sites have been located in the area.

WMMA ISSUES

Historically, the wet meadows were hydrologically supplemented with irrigation water that originated from wells located east of the LNP. Developers have purchased land east of the LNP, and the flows from irrigation have stopped.

Future restoration actions include restoring water in the form of sheet flow and increasing and improving wet meadow and upland habitat in this area. Weed control within the wetlands and uplands is critical in this area to maintain proper habitat function.

WMMA OBJECTIVES

WMMA-1: PROTECT AND ENHANCE WATER QUALITY.

Intent/Purpose

Wildlife, including the necessary organisms and their food chain, must be protected.

Actions

- Monitor water quality of artesian wells, groundwater wells, and surface flows to ensure water meets the LNP stormwater standard, to be determined in the Comprehensive Water Management Plan (CWMP).
- Proactively work with surrounding communities, developers, and local governments to prevent pollutants from entering the LNP through stormwater discharges, and control the effects of illicit discharges and accidental spills.
- Develop a long-term strategic relationship with communities to ensure water entering the WMMA will meet minimum standards for wildlife habitat requirements.
- Develop a Comprehensive Water Management Plan (CWMP).

WMMA-2: ENSURE ADEQUATE QUANTITY OF WATER IS AVAILABLE TO MEET WMMA OBJECTIVES.

Intent/Purpose

Water rights for the LNP must be protected and enforced in order to maintain a high-quality Preserve. Adequate water supply to the wetlands is important for the purpose of providing and maintaining wetland habitat for wet meadow-dependent species.

Actions

- Determine the full measure of all secured water rights, as delivered, through direct measurement at the point of diversion.
- Protect and enforce the full measure of all secured water rights within the LNP.
- Monitor groundwater levels and artesian flows to ensure secured water rights are not impaired by future withdrawals.
- Identify new source water(s) of sufficient quality and quantity to restore wetlands within the WMMA.
- Maintain the water conveyance system so that delivery of the secured water right is maximized.

WMMA-3: IMPROVE WETLAND AND UPLAND HABITAT.

Intent/Purpose

Habitat should be maintained to function as a resting, nesting, and staging area for resident and migratory birds. The manager should have the

flexibility and authority to manage undesirable species as necessary to protect desirable species populations.

Actions

- Provide adequate seasonal and annual fluctuations in water levels to maintain the wet meadows system.
- Establish a sufficient water source to sustain wet meadow habitat.
- Restore hydrology to ensure wet meadow habitat.
- Enhance upland areas to support wetlands.
- Identify areas for potential shrub-scrub restoration.
- Actively control and prevent the spread of undesirable species through the implementation of appropriate eradication techniques.

WMMA-4: MINIMIZE PESTICIDE APPLICATIONS ON THE MA.

Intent/Purpose

Given the ecology of the ecosystem and its proximity to urban areas, ongoing mosquito abatement programs are important. However, the LNP is a sensitive environment that requires a minimally intrusive approach. Effects of pesticides on aquatic insects, amphibians, fish, and other animals are not currently well understood, so extreme caution should be exercised in the application of these chemicals and the access needed to do it. The pesticide application process, via motorized vehicles, will be permitted in the LNP, provided access does not lead to the spread of noxious weeds or other undesirable impacts.

Actions

- Regularly coordinate least invasive applications through the Davis County Mosquito Abatement Program.
- Coordinate appropriate dispersal schedules based on sensitive areas, hydrologic flows, and avian reproductive cycles.
- Coordinate motorized vehicle access with LNP Manager to ensure vehicles remain on existing roads whenever possible.
- Ensure application methods do not create unwanted effects, including negative impacts to habitat, disturbance to nesting and migrating birds and other wildlife, or the spread of noxious weeds.

FARMINGTON BAY MANAGEMENT AREA – 569.40 ACRES

The Farmington Bay Management Area (FBMA) is characterized by lacustrine fringe wetlands, both emergent marsh and wet meadow, intermixed with old lake-bottom depressions that function as playas. There are several streams in this MA—including Farmington Creek, Shephards Creek, and Barnard Creek, that intersect the FBMA—but they have largely been altered by channelization, diversions, and upstream detention.

At peak flow, some streams may overflow their banks. However, upstream detentions and culverts crossing I-15, Legacy, D&RG tracks and Sheep's Road tend to

attenuate peak flows. Some hydrological analyses had been conducted to determine peak flows during most storm events; however, UDOT did not determine the stream characteristics to model the flooding potential or frequency within the LNP properties. PacificCorp will be provided access along the utility corridor through the installation of culverts to cross the streams in the LNP's northern properties.

The wildlife habitat in the FBMA has been degraded during the last 50–100 years via the alteration of natural hydrology, overgrazing, invasion of non-native vegetation, habitat fragmentation, and the clearing of vegetation for dirt roads and other infrastructure. Habitat restoration efforts in this area will increase populations of wetland-associated birds that nest in or use playa, wet meadow, and grassland habitats.

Four archaeological sites have been located in this area: 42Dv88, a prehistoric lithic and ceramic scatter; 42Dv89,

Emergent marsh habitat located in the FBMA.



the Lake Shore Bathing Resort; 42Dv112, the Townsite of Woodman; and 42Dv113, the Antelope Island Improvement Company Boat Landing. Only 42Dv88 has been recommended as eligible for the NRHP.

FBMA ISSUES

This management area provides a buffer to Farmington Bay and protects important wetland habitat in the bay area. In 2003, trash and debris were removed from two locations adjacent to Sheep's Road, and disturbed land was recontoured to match the surrounding topography. Ideally, the management approach for this area will be relatively "hands-off"; aside from noxious weed control, letting restoration occur naturally. Although the LNP has been fenced, disturbances related to unauthorized access may need to be monitored, as much of the area has been used by OHV drivers, hunters, and horseback riders, and occasionally has been used for dumping. Stormwater and spills in the ditches are primary concerns, as is the control of noxious weeds in the FBMA. This area offers important additional mitigation potential, but appropriation of water rights would be necessary to facilitate future mitigation activities.

FBMA OBJECTIVES

FBMA-1: PROTECT AND ENHANCE WATER QUALITY.

Intent/Purpose

Wildlife, including the necessary organisms and their food chain, must be protected.

Actions

- Monitor water quality flows to ensure water meets the LNP stormwater standards, to be determined in the Comprehensive Water Management Plan (CWMP).
- Proactively work with surrounding communities, developers, and local governments to prevent pollutants from entering the LNP through stormwater discharges; control the effects of illicit discharges and accidental spills; and attenuate peak flows.
- Develop a long-term strategic relationship with communities to ensure water entering the FBMA will meet minimum standards for wildlife habitat requirements.
- Develop a Comprehensive Water Management Plan (CWMP).

FBMA-2: ENSURE ADEQUATE QUANTITY OF WATER IS AVAILABLE TO MEET FBMA OBJECTIVES.

Intent/Purpose

Water rights for the LNP must be protected and enforced in order to maintain a high-quality Preserve. Farmington Bay Waterfowl Management Area (FBWMA) relies on water that travels through the FBMA. Water use and discharges must be coordinated between LNP and FBWMA to maintain appropriate habitat and meet objectives for both preserves. Dike removal on waterways in the FBMA should be coordinated with FBWMA.

Actions

- Determine the full measure of all secured water rights, as delivered, through direct measurement at the point of diversion.
- Determine adequacy and frequency of peak flow rates reaching the FBMA during the spring runoff season. If the water source is determined to be inadequate, obtain additional surface and/or ground-water rights.
- Protect and enforce the full measure of all secured water rights within the LNP.
- Maintain the water conveyance system so that delivery of water is maximized.
- Work closely with FBWMA to ensure they continue to have an adequate water supply.

FBMA-3: MAINTAIN WETLAND AND UPLAND HABITAT FOR SHOREBIRD AND GRASSLAND-NESTING BIRDS.

Intent/Purpose

Macroinvertebrate production on the grasslands and playas provides a foodbase for resident populations of shore and grassland birds. The vegetation in the FBMA also provides habitat, cover, and a food source for wildlife.

The FBMA functions as a resting, nesting, and staging area for resident and migratory birds. Hydrology in the FBMA will not be actively managed, so habitat must allow for a more naturalized hydrologic cycle.

Actions

- Actively control and prevent the spread of undesirable species through the implementation of appropriate eradication techniques.
- Restore desirable upland vegetation where appropriate.
- Maintain upland and wetland habitat based on the topography and soil characteristics.
- Allow for spring wetting of playas to augment macroinvertebrate production.
- In coordination with FBWMA, remove spoils and dikes to increase sheet flows into non-playa depressional areas (e.g. wet meadows).

FBMA-4: MINIMIZE PESTICIDE APPLICATIONS ON THE MA.

Intent/Purpose

Given the ecology of the ecosystem and its proximity to urban area, ongoing mosquito abatement programs are important. However, the LNP is a sensitive environment that requires a minimally intrusive approach. Effects of pesticides on aquatic insects, amphibians, fish, and other animals are not currently well understood, so extreme caution should be exercised in the application of these chemicals and the access needed to do it. The pesticide application process, via motorized vehicles, will be permitted in the LNP provided access does not lead to the spread of noxious weeds or other undesirable impacts.

Actions

- Regularly coordinate least invasive applications through the Davis County Mosquito Abatement Program.
- Coordinate appropriate dispersal schedules based on sensitive areas, hydrologic flows, and avian reproductive cycles.
- Coordinate motorized vehicle access with LNP Manager to ensure vehicles remain on existing roads whenever possible.
- Ensure application methods do not create unwanted effects, including negative impacts to habitat, disturbance to nesting and migrating birds and other wildlife, or the spread of noxious weeds.

FBMA-5: PROTECT THE ARCHAEOLOGICAL SITES.

Intent/Purpose

Archaeological sites are important to our understanding of the prehistory and history of the region. Certain sites are considered significant and have been recommended to be eligible for the NRHP. These sites are protected by law. In order to limit access and potential vandalism, the location of NRHP-eligible archaeological sites should be confidential information and not for public knowledge.

Actions

- Protect the locational data of archaeological sites in the FBMA.
- Limit access to archaeological sites in the FBMA.

- Monitor for cultural resources during construction activities until the enhancement phase is completed.
- Subsequent to construction phase, periodically monitor archaeological sites to ensure that they are not being vandalized.

EDUATION AND PUBLIC ACCESS

The Legacy Nature Preserve will provide opportunities for public education and passive recreation, to the extent that the activities are compatible with the Guiding Principles outlined in Chapter One. The goals of public use within the LNP will be to develop and maintain a sense of public stewardship and foster an appreciation and awareness of the Great Salt Lake ecosystem. In order to meet the goal of the Legacy Nature Preserve mission statement, "*Provide(s) in perpetuity quality wildlife habitats for mitigating impacts to wetlands and wildlife associated with the Legacy Parkway,*" the actions necessary to achieve that goal will be of primary importance.

Public access may be permitted where and when it is determined the impacts will not negatively affect wildlife habitat and wildlife behavior. The types of activities that may be permitted in the LNP will be limited to passive recreation. Passive recreation includes activities such as hiking, photography, education, interpretation and wildlife viewing. Trails will be open to foot traffic only. In order to protect the biodiversity of the area, motorized vehicles, horseback riding, bike riding, plant gathering, hunting, camping, building fires, and pets will not be allowed in the LNP.

The Section 404 permit acknowledges the possibility of a public education/interpretation program that will provide users an educational and enjoyable experience within the LNP. The acreage allowable for the public education program will be minimized to ensure compatibility with the mission of the LNP. The location of the public use area(s) will not compromise the integrity of their area's overall wetland habitat and function or wildlife behavior. Trails, kiosks, signage, parking, observation decks/towers, and additional structures may be a part of the potential education amenities. The location and type of amenities shall be coordinated with the resource agencies, neighboring education centers, the CDT, and the LNP Manager, and will be approved by the Corps.

Any education, public use, or administration structures necessary within or surrounding the LNP will minimally impact wildlife habitat and overall wetland function. Public access to the Preserve will not detract from the mission of the LNP, preserving quality wildlife in perpetuity. Any structures and/or facilities built in or around the LNP will be designed to blend in with the natural environment in order to minimize presence of humans and impacts to wildlife.

Throughout Phase II, UDOT will work closely with surrounding communities to provide a unique and context sensitive educational message. LNP's education message will highlight three main topics:

- the establishment of the LNP as mitigation for the Legacy Parkway,

- the definition and importance of mitigation, and
- the important role the LNP has in habitat connectivity within the Great Salt Lake Ecosystem.

The education opportunities and curriculum will require a separate operational plan. The Education Management Plan that will govern the public education component will be developed during Phase II and will require Corps approval before implementation. LNP educational opportunities shall align closely with existing educational centers and non-profit organizations, teachers, and informal educators to ensure that an effective educational message is delivered to the public.

Within the LNP educational opportunities may come in the form of kiosks, interpretive signing, observation towers and trails. Following designated "foot-traffic only" routes, users will learn through observation and interpretation. UDOT and the LNP Manager will partner with neighboring education centers to provide the public a location for in-depth curriculum presentation, which is likely to occur outside of the LNP at existing or future education centers. Partnerships with neighboring education centers could include: Farmington Bay Waterfowl Management Area, Bear River Bird Refuge, Kennecott Nature Center, and potential education centers along the Jordan River.

The land identified as a public use/educational area will be subject to the same deed restrictions that are placed on the rest of the LNP with the exception of allowing the placement of trails, struc-

tures, vegetative control and alteration as identified in the Education Management Plan.

COMMUNITY PRIORITIES

Interested in the public's perception of how the LNP should be managed, the CDT held an Open House in May of 2005. The CDT members answered the public's questions regarding the LNP but they also wanted to understand the community's vision for the LNP. Participants were asked to prioritize their "vision" by placing a colored sticker on the board that best represented their interests. Blue indicated their first choice and orange indicated their second. Participants were also asked to fill out a survey that outlined several different Preserve elements and further comment on what they would like the LNP to look like.

Forty-four participants attended the LNP Open House, and 26 prioritized their vision for the LNP on a survey. The results of their input are in Table 3.1.

EDUCATION AND PUBLIC ACCESS ISSUES AND OBJECTIVES

The primary issue of public use within the LNP centers on balancing habitat preservation and human impact. Public

access to the LNP will not compromise the goal and objectives of the LNP. It will be at the LNP Manager's discretion to allow public access to the management areas in order to minimize disturbance from human-related activities. Various activity buffers, depending on bird species, will need to be established to prevent impacts from humans. Disturbance during resting and nesting periods will negatively impact migratory birds and shorebirds. An increase in predation as a result of public access to the LNP is also a concern, as the construction of trails through wetlands and uplands increases the likelihood of predation.

PUBLIC ACCESS OBJECTIVES

PUB-1: CONTROL THE ACCESS OF HUMANS IN AND AROUND THE LNP.

Intent/Purpose

Negative impacts to wildlife habitat and wildlife behavior must be prohibited.

Actions

- Provide interpretive opportunities in designated areas.
- Control access through the use of carefully defined routes, fences, and signage.

Table 3.1. Vision Prioritization (Board Results)

Vision	Priority #1	Priority #2	Totals
(1) Restoration and Preservation	1	1	2
(2) Conservation and Research	5	4	9
(3) Passive Interpretation	11	10	21
(4) Active Interpretation and Education	9	4	13

PUB-2: PROVIDE YEAR-ROUND OPPORTUNITIES WITH SEASONAL CONSIDERATIONS.

Intent/Purpose

The presence of humans in particular areas within the LNP could negatively affect the nesting patterns of birds and other wildlife behavior.

Actions

- Limit humans from entering specified areas when deemed necessary.
- Provide educational material that highlights the importance of the various seasons on the ecosystem.

PUB – 3: DISCOURAGE VISUAL IMPACTS THAT REDUCE THE SCENIC QUALITY AND IMPACT WILDLIFE IN AND AROUND THE LNP.

Intent/Purpose

Impacts of commercial signage and outdoor advertising in and around the LNP could detract from the public's experience while visiting the LNP. The construction of large signs, billboards, or facilities created without consideration for the natural environment could also negatively impact wildlife habitat by creating unwanted perches for species. The use of nighttime lighting in and around the LNP could distract from the aesthetics of the LNP and negatively impact wildlife.

Actions

- Prohibit structures not associated with the managed preserve, billboards, and signage within the LNP boundaries.

- Minimize the use of nighttime lighting in and around the LNP.
- Work with neighboring property owners and communities to discourage visual impacts that reduce the scenic quality and impact wildlife in areas surrounding the LNP.

EDUCATION OBJECTIVES

EDU-1: DEVELOP A UNIQUE EDUCATIONAL MESSAGE FOR THE LNP.

Intent/Purpose

Ensure that the educational message is compatible with the messages of surrounding education centers regarding mitigation, urban interface, and natural processes.

Actions

- Provide unique educational material and innovative presentation techniques.
- Coordinate the design, message, and location of amenities with surrounding education centers.

EDU-2: PROVIDE A RANGE OF EDUCATIONAL OPPORTUNITIES.

Intent/Purpose

Ensure that an individual or groups may enjoy an educational experience that is suitable for their age, level of education, ability and understanding of the area.

Actions

- Develop curriculum appropriate for a variety of audiences.

- Work with school districts, teachers, informal educators and neighboring education facilities to establish and deliver the educational message.

EDU-3: ESTABLISH A LONG-TERM OVERSIGHT GROUP TO OVERSEE THE EDUCATION PROGRAM.

Intent/Purpose

Ensure the education program stays current with state-of-the-art educational techniques and that public access is appropriately managed to meet the long-term objectives of the LNP.

Actions

- Recruit a qualified oversight team to perpetuate an innovative education program.

EDU-3: ALLOW RESEARCH PROJECTS IN SPECIFIED AREAS WITHIN THE LNP, AS NEEDED.

Intent/Purpose

Promote advances in habitat management based on up-to-date science and technology. Allow for educational opportunities within the LNP.

Actions

- Require that potential researchers complete application process to be reviewed by the Education Oversight Team.
- Coordinate research activities with surrounding management areas, if necessary.

CHAPTER FOUR

4

ADAPTIVE MANAGEMENT PLAN IMPLEMENTATION FOR PHASES I-III LONG-TERM FINANCIAL PACKAGE ADMINISTRATION AND STAFFING



ADAPTIVE MANAGEMENT PLAN IMPLEMENTATION

In April 2001, the Corps approved an addendum to the 2000 Final EIS Mitigation Plan. The approval of the revised mitigation plan for the entire 2,098-acre LNP allowed UDOT to begin mitigation, monitoring, and reporting activities detailed in the Section 404 permit. The mitigation actions and monitoring have continued despite the legal injunction that halted the construction of the Parkway in 2001.

Once the mitigation requirements, outlined in the Section 404 permit, are completed the adaptive management and monitoring will begin. The imple-

mentation of this Management Plan, developed by UDOT and the CDT, will provide management goals and actions for the LNP managers for years to come.

PHASE I

The wetland mitigation planning to compensate for impacts from the proposed Legacy Parkway Project began in the 1990s. Mitigation measures within the LNP, consisting of preservation, restoration/enhancement, and creation, have been developed through extensive collection of field data, analysis of wetland and wildlife resources and functions, and coordination with resource and regulatory agencies.

LNP Management Plan timeline.

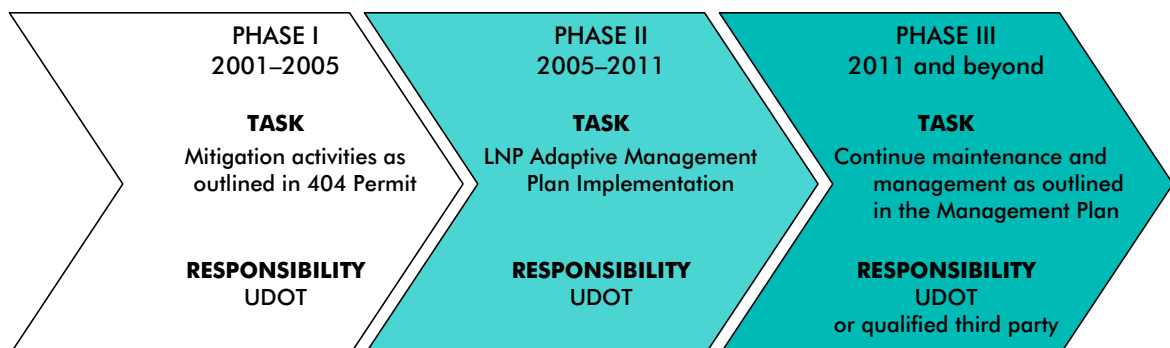


Table 4.1. Summary of LNP Phase I Implementation Measures

Implementation Measure	As of August 2005	To Be Completed
Acquire land	UDOT has purchased about 90% of the 2,100 acres.	UDOT is pursuing all remaining properties via eminent domain.
Remove roads	Over 8,000 linear feet of dirt roads have been removed and revegetated, resulting in the conversion of these areas to 2.3 acres of improved wildlife habitats and adjacent habitat connectivity.	Road removal is complete. Few areas need to be reseeded.
Remove fill and debris	Over 3,000 dump truck loads of debris and fill material (over 900 tires, extensive cement piles, 5 car frames) and 5 large structures have been removed.	Additional areas containing fill and debris have been identified for future cleanup. The 2 areas include 2425 South and 900 North properties.
Fill in drainage ditches	To restore the natural water table, over 18,000 linear feet of ditches have been filled in with spoils contoured back to the natural topography.	Completed.
Remove internal fences	6,800 linear feet of fences within the LNP have been removed.	Some internal fenceposts still need to be removed.
Install perimeter fence and signage	LNP perimeter fencing has been installed to reduce human disturbance. Nearly 200 "No Trespassing" and "Authorized Access Only" signs have been posted.	The perimeter fencing has been completed (where not adjacent to other protected areas).
End livestock grazing	60% to 70% of the 2,100-acre LNP was previously subjected to grazing. All traditional livestock grazing has been terminated and is prohibited.	Completed. Controlled grazing may be considered for managing habitat.
Remove structures	All major structures have been removed except for the building on 900 North, which is approved to remain as a maintenance shed.	A few minor structures remain that are slated for removal.
Relocate utilities	Two major utility lines, Questar and South Davis Sewer District, have been relocated outside the LNP.	Completed.

Table 4.1. Summary of LNP Phase I Implementation Measures, continued

Implementation Measure	As of August 2005	To Be Completed
Provide utility corridor access	Agreement is in place with PacifiCorp. Agreement restricts access points to minimize wildlife habitat disturbance.	Install culverts to allow PacifiCorp to cross streams within its power corridor.
Restore hydrology	Extensive restoration activities for the Jordan River floodplain and adjacent areas have been completed, including designing and constructing a water delivery and control system, blocking underdrain system, and filling in ditches and drains.	Develop and implement Comprehensive Water Management Plan in order to manage LNP hydrology to benefit wildlife.
Install water control structures	The water delivery system has been designed and all major control structures have been constructed and installed.	A few minor control structures need to be installed to effectively deliver and manage water to the evaporative basins.
Create island	Complete; refer to the 2003 annual Section 404 permit status report.	Completed.
Acquire water rights	Most water rights that will provide sufficient hydrology to the Jordan River floodplain have been acquired; these include rights to North Canyon and the Jordan River.	UDOT water rights attorney continues to work on investigating and procuring potential water rights.
Characterize water quality of external water sources	Complete; refer to the 2004 annual Section 404 permit status report.	Completed.
Install low berm	Construction of the berm adjacent to the State Canal was completed in January 2005.	Completed.
Drill wells	Potential sites for artesian wells pertaining to wetlands creation have been identified; well water rights have been investigated to sustain area wet meadows.	All wells determined necessary for mitigation still need to be drilled.

Table 4.1. Summary of LNP Phase I Implementation Measures, continued

Implementation Measure	As of August 2005	To Be Completed
Develop and implement Comprehensive Water Management Plan	This plan has not yet been developed; it will be included in adaptive management planning by the CDT.	Develop and implement plan.
Conduct noxious weed control	Noxious weed/invasive species habitats have been mapped, goat grazing has been used as a biological measure to control weeds, and a Noxious Weed Management Workshop, involving neighboring management areas, community and duck clubs, has been held.	Develop noxious weed management plan.

Source: Mitigation Plan for the Legacy Nature Preserve, August 2005.

Official mitigation actions and reporting began in 2001 after the Corps granted the Section 404 permit. Annual status reports have been submitted to the Corps detailing property acquisition and mitigation activities for 2001, 2002, 2003, and 2004. It is anticipated that Phase I actions will be completed in late 2005 and immediately followed by Phase II. In the event that not all Phase I

measures have been completed by the end of 2005, these will be completed at the beginning of Phase II.

PHASE II

Phase II implementation will begin in late 2005 or early 2006 and, according to the Section 404 permit, will continue for a minimum of five years until the Corps determines the mitigation to be fully functional. It is during this phase and throughout Phase III that the management actions specified in Chapter 3 of this document will be performed. The unique issues of each management area will be addressed, and their objectives will be met throughout Phase II and III.



Over 3,000 truckloads of debris have been removed from the LNP.

The CDT, which began meeting during Phase I to develop this Adaptive Management Plan, will continue to play a role in Phase II activities. They will continue to provide valuable management suggestions and feedback as implementation of the Phase II begins. Their assistance will be required throughout the development of the detailed management plans, described below. The knowledge and expertise provided by the CDT will continue in Phase III.

ADAPTIVE MANAGEMENT PLAN DEVELOPMENT

An LNP Manager will be provided by UDOT to help evaluate the performance of the mitigation measures, report progress to the Corps, and perform the actions outlined in this adaptive management plan. Three additional management plans—one outlining public use and education within the LNP, one detailing the treatment and management of noxious weed and desirable vegetation, and one detailing the treatment of stormwater runoff, sediment control, and water quality issues (the Comprehensive Water Management Plan)—will also be completed during this phase.

COMPREHENSIVE WATER MANAGEMENT PLAN

The Comprehensive Water Management Plan (CWMP) will be developed in enough detail to assist the LNP Manager in addressing water management issues and meeting the objectives of this adaptive management plan with regard to water quality and quantity. Implementation of the CWMP will continue in perpetuity.

The CWMP will be tailored to address the unique needs of each of the five management areas and will include the following components:

- **Stormwater Management** – In concert with existing State regulations, develop, implement, and enforce stormwater ordinance-based language that establishes minimum water quality standards, protects against illicit discharges, and designates detention storage requirements for stormwater run-off.
- **Water Quality Management** – Establish protective water quality criteria consistent with management area objectives. Establish methodology for protecting and enforcing water rights and maintaining water conveyance infrastructure; establish seasonal and annual flow requirements that provide hydrologic variability; develop methodology for artesian well placement and other source waters as necessary.
- **Sediment Management** – Establish methodology for controlling sedimentation within open channels and sloughs, including operation and maintenance requirements.
- **Monitoring** – Establish methodology for monitoring instream flows, incoming stormflows, diversions, groundwater levels, water quality parameters of concern, and soil chemistry (e.g., salinity).

PUBLIC USE AND EDUCATION MANAGEMENT PLAN

The Public Use and Education Management Plan will also be completed during Phase II. This plan will outline management techniques regarding the day-to-

day functions of the LNP. The Public Use and Education Management Plan will include the following components:

- Public Use Management – Establish appropriate uses, access, permitting, and enforcement procedures within the LNP. Address the need for facilities necessary to the management and administration of the LNP.
- Education Management – Develop a regionally coordinated education and interpretation program, curriculum, and opportunities for research in the LNP.

The Public Use and Education Management Plan will ensure that public use and access to the LNP are compatible with the mission and guiding principles.

VEGETATION MANAGEMENT PLAN

The final management plan to be developed during Phase II is the Vegetation Management Plan. This plan will assist the Manager in controlling and possibly

eliminating the spread of noxious weeds and invasive species. The plan will include the following:

- Baseline Surveys – Map noxious weed and invasive species types and locations.
- Species Description – A description of weed species known or with potential to occur in the planning area, damage and threats posed by noxious weeds.
- Weed Management Objectives – Establish specific and measurable objectives for priority weed species within each management area.
- Management Techniques – Establish appropriate weed control options (e.g. mechanical, manual, biological, and/or chemical approaches), planned control actions for each priority weed species, provide guidelines for use of each weed control option
- Monitoring and Evaluation – Establish monitoring plan for the LNP, monitor the control actions over time



Controlling non-native vegetation such as whitetop (above left) and Scotch thistle (above right) is a key issue in the ongoing management of the LNP.

The use of goats for noxious weed control is a biological method being used to minimize pesticide applications on the LNP.



to evaluate their efficacy, provide ongoing weed management reports, determine whether new or additional control actions are necessary to meet objectives

- Resource Needs – Establish the staff and equipment needed to implement plan (including surveys, control actions, and monitoring)

PHASE III

Once UDOT determines that Phase I mitigation is fully functional and that Phase II requirements have been met, a final report will be submitted to the Corps. The Corps will then confirm the success of the mitigation obligation or require additional years of monitoring. Upon written approval from the Corps, UDOT will make a decision to either retain management of the LNP or seek to transfer the LNP to an acceptable third party or parties. Regardless of the manager, long-term operation and maintenance of the mitigation properties are anticipated to begin in 2011 and will continue in perpetuity.

As mentioned earlier, the CDT established in Phase I will continue to provide scientific knowledge and constructive management guidance to the LNP Manager as needed throughout Phase III.

LONG-TERM FINANCIAL PACKAGE

To support management, monitoring, and reporting activities for the LNP, adequate, long-term funding is necessary: not only for current mitigation activities such as the documentation of avian species, plant communities, water chemistry, and hydrology that has been occurring since 2001, but also for ensuring the maintenance and operation of a high-quality nature preserve over the long term.

According to the Section 404 permit the permittee (UDOT) will "provide for a long-term financial package to support the management and maintenance of the mitigation properties so that wetland functions are maintained in perpetuity."

Should UDOT transfer the responsibility of the LNP, they will notify the Corps no later than ninety (90) day prior to the transfer. The notification must provide the Corps with adequate assurances that the LNP will be managed to preserve the mitigation objectives outlined in the Section 404 permit. The Corps must approve of any transfer of responsibility to an outside organization.

To date, UDOT has been responsible for the funding of the Phase I mitigation efforts. They will also fund the Adaptive Management phase (Phase II) in its entirety. Throughout Phase II (the Adaptive Management phase), UDOT will gather cost data on Phase II to determine the amount of annual funding necessary for Phase III management and promotion of long-term preservation of the area. The costs associated with Phase II that are anticipated to be necessary in Phase III include:

- The employment of an LNP Manager
- An office facility for the Manager
- Equipment and equipment storage
- Annual reporting to the Corps, as appropriate
- Monitoring
- Ongoing weed and water management
- Implement the actions required to meet the management area objectives

Once the cost analysis is complete, UDOT will establish an endowment to ensure the long-term management of the LNP. The endowment will provide

financial assurances that UDOT or a qualified third party can appropriately maintain the LNP in perpetuity.

The LNP endowment established by UDOT will require effective governance to ensure its success. The endowment will be managed as a non-profit 501(c)(3) organization governed by a Board of Directors. The Board of Directors will hold fiduciary responsibility for the LNP operations. In addition to the financial responsibilities, the Board will also oversee the ongoing adaptive management applications in the LNP. The board members will ensure that the LNP Mission Statement and Goals, established by the CDT, are upheld.

A knowledgeable and highly qualified team must perform financial oversight of the LNP endowment to ensure the long-term success of the LNP. The Board of Directors will consist of a Chair, Vice Chair, Treasurer, Secretary, and two board members, at a minimum. The Board of Directors' experience and expertise will range from biology, ecology, and land-use planning to engineering and accounting. It is important that the members who manage the financial aspect of the endowment can also make informed decisions based on the best available science.

ADMINISTRATION AND STAFFING

PHASE I

UDOT and its contractors/consultants have been responsible for the mitigation efforts of Phase I. In order to meet Section 404 permit requirements UDOT

has coordinated with other agencies and stakeholders with appropriate expertise to complete tasks on the LNP.

As the Phase I work comes to an end, UDOT will shift its efforts from specific mitigation tasks to an overall adaptive management strategy for the 2,098-acre LNP.

PHASE II

Under permit requirements, UDOT will continue to be responsible for the mitigation and monitoring actions on the LNP and will implement this adaptive management plan for the duration of Phase II. During this phase, the administrator will monitor and evaluate the conditions, threats and concerns in the management of the LNP.

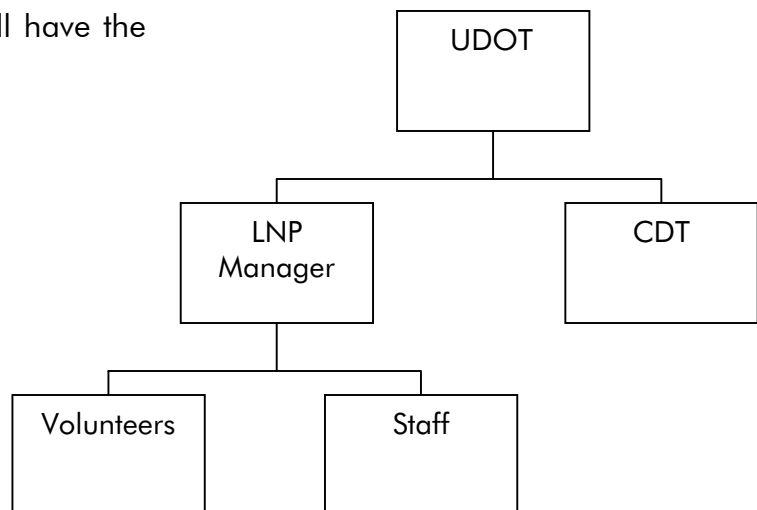
A full-time on-site LNP Manager will be hired to carry out management actions and monitor the effects of Phase I mitigation. The LNP Manager will have the following qualifications:

- Minimum of Bachelor's of Science in natural resources, watershed hydrology, geology, ecology, biology, or other conservation-related area.
- Five or more years of experience in wetlands management.
- Knowledge of current trends in wetlands ecology, biology, and adaptive management techniques.
- A demonstrated ability to gain cooperation from individuals and groups.

The LNP Manager will report directly to UDOT throughout Phase II.

If necessary, additional staff, interns, or volunteers may be used to assist in managing the LNP. The LNP Manager, at his/her discretion and based on need, will outline additional staffing requirements and qualifications.

Phase II organizational structure. The LNP Manager will report directly to UDOT.



PHASE III

The long-term management of Phase III is to be completed by UDOT or a qualified third party. Should UDOT turn management responsibility over to a third party, the party must demonstrate knowledge and experience in science-based conservation and planning processes. The managing entity will fulfill the mission and goals outlined in this adaptive management plan and will ensure that the 2,098-acre LNP is preserved for future generations.

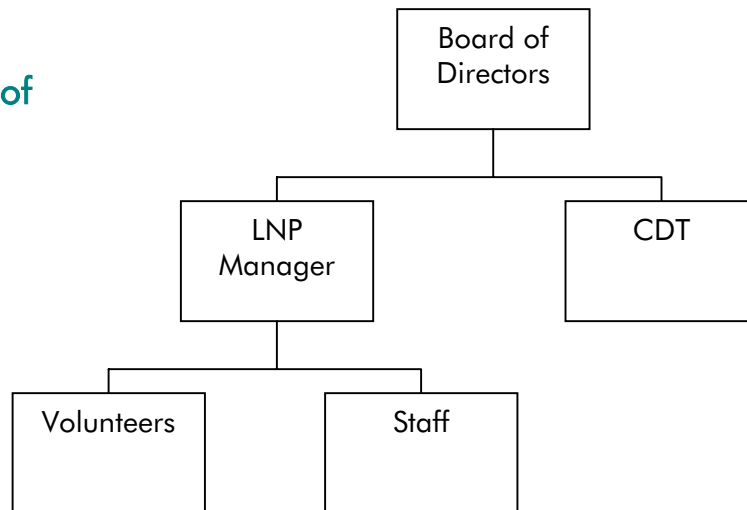
The funding for the administration and staffing of Phase III will come from the LNP endowment established by UDOT. A Board of Directors will be established

to oversee the endowment prior to Phase III implementation and will meet no less than twice a year.

The long-term management of the LNP will necessitate one on-site, full-time manager. During Phase III the manager will report to the Board of Directors and work closely with the CDT. The CDT will also report to the Board of Directors and provide them with expertise and LNP management input when necessary.

Additional staff, interns, and volunteers may be required to complete specific projects on the LNP. As deemed appropriate by the LNP Manager, additional staff will be hired on a part-time, temporary, or per diem basis in order to assist the LNP Manager in reaching the management goals.

Phase III organizational structure. The LNP Manager will report directly to the Board of Directors.



CHAPTER FIVE

5

REFERENCES



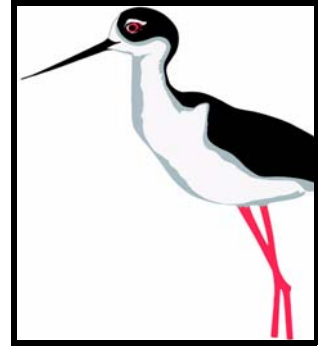
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APPENDIX A

A

ABBREVIATIONS AND ACRONYMS



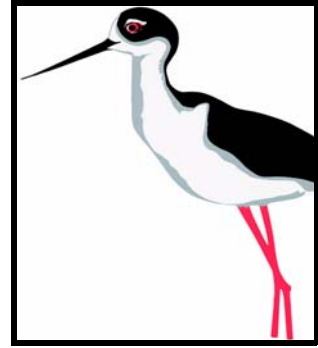
CDT	Collaborative Design Team
Corps	United States Army Corps of Engineers
CWMP	Comprehensive Water Management Plan
D&RG	Denver & Rio Grande
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
FBWMA	Farmington Bay Waterfowl Management Area
FEMA	Federal Emergency Management Agency
LNP	Legacy Nature Preserve
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
LNP	Legacy Nature Preserve
SEIS	Supplemental Environmental Impact Statement
SWCA	SWCA Environmental Consultants
UDOT	Utah Department of Transportation
USFWS	United States Fish and Wildlife Service

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APPENDIX B

B

GLOSSARY



100-year floodplain – The land area adjacent to a river or stream that would be inundated by (and convey) a flood of a given magnitude that is statistically likely to occur once every 100 years. In other words, there is a 1% probability that a flood of this magnitude would occur in this area in any given year. The area of the 100-year floodplain surrounding a particular channel is determined from statistical analysis; it does not indicate that a 100-year flood will not occur more than once within 100 years (see also *floodplain* and *500-year floodplain*).

Adaptive management – A process that uses scientific methods and information to help formulate, evaluate, adjust, and improve management strategies.

Alkaline – A characteristic of water or soil that contains enough alkali substance to raise the pH above 7.0.

Aquifer – An underground geological formation, or group of formations, containing water. Aquifers are sources of groundwater for wells and springs.

Archaeological site – A relatively discrete, definable accumulation of cultural materials (typically refuse and debris) that reflects the past activities of an individual or group, retains integrity of location, and is reasonably interpretable in terms of past human behavior at that location (see also *Site*).

Archaeology – A sub-discipline of anthropology that is dedicated to the scientific study of material remains left behind by humans in order to answer specific questions about past human activities and culture.

Artesian (aquifer or well) – Water held under pressure in porous rock or soil and confined by impermeable geological formations.

Artifact – Any portable object that is a product of past human activity.

Channel – An open conduit (either naturally or artificially created) that periodically or continuously contains moving water, or that forms a connecting link between two bodies of water. Creeks, rivers, runs, branches, anabranches, and tributaries are examples of natural channels. Canals and floodways are examples of artificial channels.

Channelization – The straightening and deepening of streams, which causes water to move faster.

Cubic feet per second (cfs) – A unit of measure expressing the rate of discharge of water. One cubic foot per second is equal to the discharge of a stream of a 1-foot-wide, 1-foot-deep, rectangular cross section, through which the water travels at an average velocity of 1 foot per second.

Cultural resource – Historic and prehistoric archaeological sites, architectural features (e.g., structures, buildings, roads, ditches, bridges), records or documents, artifacts or features, or traditional cultural properties that are more than 50 years in age or that have demonstrated some great role in history within the past 50 years.

Culvert – A transverse drain or waterway of masonry, concrete, and/or metal under a road, railroad, canal, or small bridge.

Detention basin – A basin for temporary storage of stormwater that is used to control the peak discharge rates and that serves as filtering device for gravity-settling pollutants.

Dike – A massive wall or embankment built around a low-lying area to prevent flooding.

Discharge – A general term that means outflow. The use of this term is not restricted to a natural course or location; it can describe the flow of water from a pipe or from a drainage basin. If the discharge occurs in some course or channel, it is correct to speak of the discharge of a canal or stream.

Dissolved oxygen (DO) – The amount of oxygen (O_2) dissolved in water, measured in parts per million. Freely available dissolved oxygen is vital to fish and other aquatic life and for the prevention of odors.

Disturbance – Any event or series of events that disrupts and/or alters the physical environment for a sustained period.

Diversion – The taking of water from a stream or other body of water into a canal, pipe, or other conduit.

Dredge – To mechanically remove sediments and debris from the bottom of a river or other water body to increase storage or conveyance capacity. Dredging activities may be subject to regulation under Section 404 of the Clean Water Act.

Eligible – Cultural resources that possess integrity of location, design, setting, workmanship, materials, feeling, and/or association, and have been determined to meet one or more of the criteria for nomination to the National Register of Historic Places (see also *Not eligible*).

Emergent marsh – Emergent wetland containing erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. The vegetation is present for most of the growing season in most years and is usually perennial. Emergent wetlands/marshes occur within all water regimes defined by Cowardin et al. (1979) except subtidal and irregularly exposed regimes. Examples of emergent vegetation are bulrushes, sedges, cattail, and common reed, as well as broad-leaved species.

Evaporation – The process by which water is changed from the liquid or the solid state into the vapor state. In hydrology, evaporation is vaporization that takes place at a temperature below the boiling point.

Feature – In a cultural-resources context, any type of archaeological remains that is not portable, such as soil color changes, architectural remains, etc. A feature may range in size from a single posthole to a large, linear, constructed element such as a canal.

Floodplain – The area of land adjacent to a river or stream that is subject to recurring, periodic inundation.

Forb – An herbaceous plant other than a grass, sedge, or other grasslike plant.

Fragmentation – The process by which habitats or vegetative communities are increasingly subdivided into smaller units, resulting in their increased isolation as well as losses of total habitat area.

Groundwater – Water occurring beneath the land surface in water-bearing layers of rock called aquifers. When groundwater is a major source of drinking water, concerns regarding contamination from leaching agricultural or industrial pollutants or leaking underground storage tanks may arise.

Habitat – An environment that provides the life requisites (food, shelter, etc.) for a given organism or population, to a degree sufficient for survival.

Herbaceous – Herblike; not woody.

Historic property – Any cultural resource that is listed on the National Register of Historic Places (NRHP) or is determined eligible for listing on the NRHP. Artifacts, records, and remains that are related to and located within such properties are included (see also *Site*).

Historical – Materials, buildings, or structures associated with persons who lived or events that occurred during the time when written records were maintained, but are aged at least 50 years or more.

Hydric soil – Soil that is wet long enough to periodically produce anaerobic conditions, thereby influencing the growth of plants.

Hydrology – The science encompassing the properties, distribution, and circulation of water as it occurs in the atmosphere, on the surface of the ground, and underground.

Hydrophyte – Any plant growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content (plants typically found in wet habitats).

Hydrophytic – Water-loving.

Intermittently flooded – Water regime in the Cowardin et al. 1979 wetland classification, in which the substrate is usually exposed, but surface water is present for variable periods without detectable seasonal periodicity.

Isolated artifacts (or features) – Cultural resources that occur without sufficient volume or integrity to convey interpretable association with aspects of past human behavior and, as a result, cannot be evaluated under the criteria of the National Register of Historic Places.

Jurisdictional wetlands – Wetlands that are regulated by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act of 1977. Jurisdictional wetlands must exhibit hydrology, hydrophytes, and hydric soils. Areas that generally function ecologically as wetlands, but exhibit only one or two of the three characteristics, do not qualify as jurisdictional wetlands; thus, activities in these wetlands are not regulated under Section 404. Nonetheless, such wetlands may still perform valuable ecological functions.

Lacustrine – Of or pertaining to a lake; living or growing in a lake.

Lacustrine fringe – Fringe wetlands that occur along edges of lakes where water moves in and out of the wetland due to effects of wind, waves, and seiches. Dominant flow is bidirectional across the surface, and a long hydroperiod can result from cumulative frequency of many flooding events.

Lithic scatter – A cultural resource site type that possesses evidence, in the form of flaked stone debris (flakes or debitage), associated with the reduction of toolstone materials in the effort of manufacturing tools.

Marsh – A type of wetland that does not accumulate appreciable peat deposits and is dominated by herbaceous vegetation. Marshes may be fresh or saltwater, tidal or non-tidal (see *Wetlands*).

Meander – The winding of a stream channel. Meander may also refer to a specific bend in a stream channel.

Mitigation – Actions taken to reduce the level or intensity of negative influences in a project proposal. Actions taken to compensate for actual or potential adverse effects.

National Historic Preservation Act of 1966, as amended (NHPA) – Federal legislation (16 U.S.C. § 470) establishing a national program for the preservation of historic properties (see also *Historic properties*).

National Register of Historic Places (NRHP) – The listing of cultural resources recognized by the U.S. Department of the Interior, National Park Service to be significant to the history of the region, state, or nation. These resources are typically given specific boundaries and official designations by name as a result of their nomination. Federal agencies are required by the National Historic Preservation Act (NHPA) to consider the effects of their undertaking upon sites listed on or eligible for listing on the NRHP.

Native American – As defined under federal legislation (25 U.S.C. § 3000.10), peoples, events, or materials of (or relating to) a tribe, people, or culture that is indigenous to the U.S.

Native plant species – A species that is part of the historical vegetation community of a given area (at least, prior to human influence).

Neotropical migratory birds – Birds that breed north of Mexico and overwinter largely south of the U.S.

Not eligible – Cultural resources that have been determined to not possess integrity of location, design, setting, workmanship, materials, feeling, and/or association, and do not meet one or more of the criteria of the National Register of Historic Places (see also *Eligible*).

Noxious weed – Any living stage (including seeds and reproductive parts) of a parasitic or other plant that is of foreign origin, is new to or not widely prevalent in the U.S., and/or can directly or indirectly injure crops, other useful plants, livestock, poultry, or other interests of agriculture, including irrigation, navigation, fish and wildlife habitat or resources, or public health or safety.

Open water – Nomenclature from Cowardin et al. (1979) to describe permanently flooded lands lying below the deepwater boundary of wetlands. Deepwater habitats include environments where surface water is permanent and often deep so that water, rather than air, is the principal medium within which the dominant organisms live, whether or not they are attached to the substrate. As in wetlands, the dominant plants are hydrophytes; however, the substrates are considered nonsoil because the water is too deep to support emergent vegetation.

Overland flow – The flow of rainwater or snowmelt over the land surface toward stream channels. After it enters a stream, it becomes runoff.

pH – An expression of the intensity of the basic or acidic condition of a liquid; pH may range from 0 to 14, where 0 is the most acidic, 7 is neutral, and 14 is the most basic. Natural waters usually have a pH between 6.5 and 8.5.

Playa – Dry lakes located within enclosed drainage basins that form in association with tectonic movements. "Periods of inundation in pluvial lakes, or playas, depend upon climate and the timing of storm events. In the Great Basin, precipitation is typically frequent enough that playas contain water from late winter through mid-summer. Playas generally consist of fine-grained sediments, largely devoid of vegetation. ... Annual alluvial inputs from surrounding landscape and runoff from snow melt and seasonal storms have resulted in continued deposition of fine sediments and salts. The concentration and distribution of salts and vegetation vary with water inflow and evaporation rates. If the inflow and evaporation rates are in balance, a permanent body of water is maintained at the lowest part of the basin. Over time, the salts become concentrated in these small lakes or marshes, and the shores and shallow waters are vegetated by halophytes. Playas are typically located where evaporation exceeds inflow" (Lichvar et al. 1995).

Precipitation – As used in hydrology, precipitation is the discharge of water, in liquid or solid state, out of the atmosphere, generally upon a land or water surface. It is the common process by which atmospheric water becomes surface or subsurface water. Precipitation includes rainfall, snow, hail, and sleet.

Prehistoric – Materials, buildings, or structures associated with persons who lived or events that occurred prior to the time when written records were maintained.

Recharge – The process by which water is added to a zone of saturation, usually by percolation from the soil surface (e.g., the recharge of an aquifer).

Recharge area – A land area in which water reaches the zone of saturation from surface percolation (e.g., where rainwater soaks through the earth to reach an aquifer).

Riparian – A characteristic of the banks and adjacent areas of a river or stream and the associated vegetation requiring intermediate levels of soil moisture (e.g., mesic vegetation). "Riparian ecosystems are ecosystems with a high water table because of proximity to an aquatic ecosystem or subsurface water. Riparian ecosystems usually occur as an ecotone between aquatic and upland ecosystems but have distinct vegetation and soil characteristics. Aridity, topographic relief, and presence of depositional soils most strongly influence the extent of high water tables and associated riparian ecosystems. These ecosystems are most commonly recognized as bottomland hardwood and floodplain forest in the eastern and central U.S. and as bosque or streambank vegetation in the west. Riparian ecosystems are uniquely characterized by the combination of high species diversity, high species densities and high productivity. Continuous interactions occur between riparian, aquatic, and upland terrestrial ecosystems through exchanges of energy, nutrients, and species" (Johnson et al. 1979).

Riverine – On or near the banks of a river; riparian. Riverine also means relating to, formed by, or resembling a river.

Runoff – The precipitation, snowmelt, or irrigation water that runs off the land into streams or other surface water. It can carry pollutants from the air and land into receiving waters. It is the same as streamflow unaffected by artificial diversions, storage, or other works of humanity in or on the stream channels.

Salinity – The percentage of salt in water.

Sediment – The loose particles of rock or minerals that are suspended, transported, and deposited by water.

Sedimentation – The settling of sediments via gravity.

Scrub-shrub wetland – Class in the Cowardin et al. 1979 wetland classification referring to areas dominated by woody vegetation less than 6 meters (20 feet) tall. Scrub-shrub wetlands in this area are typically dominated by a mix of hydrophytic woody shrubs and some herbaceous vegetation species such as salt cedar and Russian olive.

Site – In a cultural-resources context, a vernacular term used to describe cultural resources that occur with sufficient context, association, volume, or integrity that they are reasonably interpretable in terms of past human behavior. Individual sites may be given a proper name or an official designation.

Spoil – Dirt or rock removed from its original location—destroying the composition of the soil in the process—as in strip-mining, dredging, or construction.

Slope wetlands – Wetlands normally occurring on sloping land; elevation gradients may range from steep hillsides to slight slopes. Principal water sources for these wetlands are groundwater return flow and interflow from surrounding uplands as well as precipitation. Surface water flow movement (hydrodynamics) is unidirectional.

Stream channel – The bed where a natural stream of water runs or may run; the long narrow depression shaped by the concentrated flow of a stream and covered continuously or periodically by water.

Topography – The physical features of a surface area, including relative elevations and the position of natural and man-made (i.e., anthropogenic) features.

Total dissolved solids (TDS) – All material that passes the standard glass river filter, afterwards called total filterable residue. TDS is frequently used in the context of salinity.

Unconsolidated shore – Class in Cowardin et al. (1979) wetland classification referring to all wetland habitats having three characteristics: (1) unconsolidated substrates with less than 75% areal cover of stones, boulders, or bedrock; (2) less than 30% areal cover of vegetation other than pioneering plants; and (3) any of the following water regimes – irregularly exposed, regularly flooded, irregularly flooded, seasonally flooded, temporarily flooded, intermittently flooded, saturated, or artificially flooded.

Undesirable plant – A plant species classified as undesirable, noxious, harmful, exotic, injurious, or poisonous under state or federal law, but not including species listed as endangered by the Endangered Species Act or species indigenous to the area where control measures are to be taken.

Water control feature – General term for a structure that is constructed for the purpose of regulating erosion or flow of water.

Water table – The upper surface of a zone of saturation; the level of groundwater.

Watershed – A geographical region that drains into a particular body of water.

Weed – Any plant growing where it is not wanted.

Wet Meadow – Grassland with waterlogged soil near the surface but without standing water most of the year (Mitsch and Gosselink 1986).

Wetlands – Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For the purposes of this document, wetlands have one or more of the following three attributes: (a) at least periodically, the land supports predominantly

hydrophytes; (b) the substrate is predominantly undrained hydric soil; and (c) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

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